



Melelen Radiation Ilo Ailiñ ko Ituiōñ Ilo Majōl, ko Rar Etali Ilo 1978

The Meaning of Radiation for Those Atolls
in the Northern Part of the Marshall Islands
That Were Surveyed in 1978

This publication is on "non-rottable"
paper.

Philip Mardie!
Files, CP-33

D103

Melelen Radiation Ilo Ailiñ ko Ituiōñ Ilo Majōl, ko Rar Etali Ilo 1978

The Meaning of Radiation for Those Atolls in the Northern
Part of the Marshall Islands That Were Surveyed in 1978

	Page		Page
Kadkadin Book In	2	Introduction	3
Chapter 1: Tibdrikdik im Atom ko Reradioactive jen Atomic Bomb ko	5	Chapter 1: Tiny Particles and Radioactive Atoms from Atomic Bombs [Fallout]	5
Chapter 2: Men ko Reradioactive kab Juōn Kajur eo Etan Radiation	10	Chapter 2: Things That Are Radioactive and an Energy Called Radiation	11
Chapter 3: Wāwen an Armij Maroñ Bōk Radiation	17	Chapter 3: The Ways People Can Receive Radiation	17
Chapter 4: Wāwen an Radiation Maroñ Kōmmōn Jorrān	23	Chapter 4: The Ways That Radiation Could Cause Harm	23
Chapter 5: Wāwen Joñe Joñan Radiation	28	Chapter 5: How Radiation is Measured	28
Chapter 6: Melele ko Retōbrak Jen Joñok Lōñlōñ ko	33	Chapter 6: The Information Obtained from the Many Measurements	33
Melelen Nan ko Rekāl	62	The Meaning of New Words [Glossary]	63

Kajin Majōl in ear ukok ekkar ñōn melele ko ilo
kajin English, im kajin English in ilo book in ear
ukok jen kajin Majōl.

The Marshallese text is a dynamic-equivalent translation of an original English
draft, and the English text is a modified literal translation of the Marshallese
text.

United States Department of Energy, Washington, D.C., November, 1982

Kadkadin Book in

Ikōtan 1946 im 1958 Kien eo an United States ear kōkōmmālmel kin atomic bomb ko ilo ailiñ in Bikini im ilo ailiñ in Enewetak. Ilo ien eo wōt rar kōkōmmālmel, rar jino etale jet ailiñ in Majōl bwe ren maroñ bōk melele kin joñan radiation ilo ailiñ ko, im katak kein rej wōnmanlok wōt. Scientist ro rar bōk mōttan bwirej im dren, im bareinwōt mōttan leen keinikkan ko im menin mour ko jen lojet kab ko ion ene, ñōn air bukōt kain atom rot ko reradioactive ilo men kein, bareinwōt rar joñe joñan atom kein reradioactive. Rar bareinwōt kālōk kin wan ekkāke ko ion ene ko im joñe joñan radiation ko ie kin kein kakōlkōl ko. Emwij an scientist ro je elōñ report ko ilo kajin English kin melele ko rar tōbrak jen katak kein. Report kein emwij jei ilo book bwe jabrewōt armij ilo lōl in ren maroñ riti.

Jen 1972 lok ñōn 1979, scientist ro rar bar etale ailiñ in Enewetak im ear laplok melele ko air kin ailiñ eo. Melele kein rebed ilo book eo naetan "Ailiñ in Enewetak Rainin," eo emwij je ilo kajin Majōl im emwij lelok ñōn ri Enewetak ilo 1979. Ri utiej ro im scientist ro rar kwelok ibben ri Enewetak i Ujelang im konono ibbeir kin melele ko ilo book eo. Katak ko kin ailiñ in Enewetak rej wōnmanlok wōt.

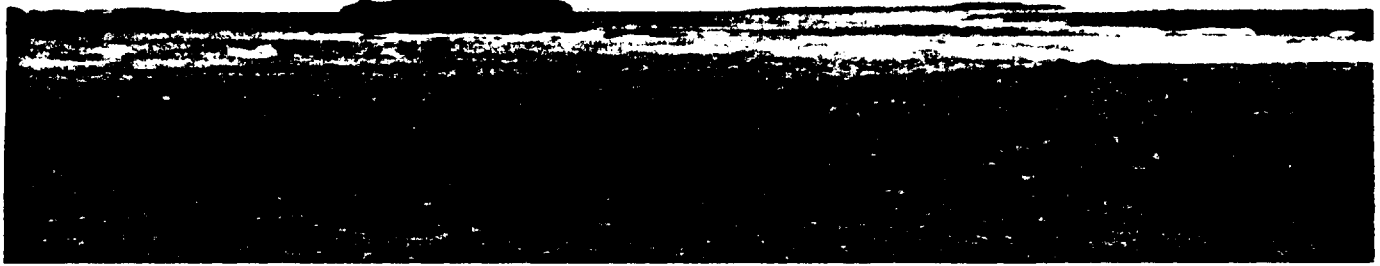
Ilo 1978 Kien eo an United States ear etali ailiñ kein ituiōñ ilo Majōl: Rongelap, Utrik, Taka, Bikar, Rongrik, Ailinginae, Likiep, Ailuk, Jemo, Mejit, Wotho, Ujelang im Bikini. Unin an scientist ro kālet ailiñ kein bwe ren ekkatak kaki, kinke bwelen rar jejjete ijo kōto ear ilok ielok ilo jet ian ien kōkōmmālmel ko, kab kinke eor jet melele ko

rar tōbrak moktalok ikijjen atom ko reradioactive ilo jet ian ailiñ kein. Alikkar bwe ejjab joñan wōt juōn an melkwarar im tibdrikdrikin bomb ko wōtlok na ion kajjojo ailiñ kein, kin men in Kien eo an United States ear kōnan lukkun jelā ewi joñan radiation ilo ailiñ kein kajjojo. Rar kālōk ion ene ko im joñe joñan gamma radiation eo ej itok jeni. Rar kanne elōñlok jen 5,000 plastic bag jiddrik ko kin mōttan bwirej, dren, leen keinikkan, menin mour ko jen lojet kab ko ion ene, im rar kōmmōn elōñlok jen 19,000 joñok ko jen men kein.

Melele ko rar tōbrak ikijjen ailiñ in Bikini rebed ilo book eo naetan "Melelen Radiation ilo Ailiñ in Bikini," eo im emwij je ilo kajin Majōl im lelok ñōn ri Bikini ilo 1980. Ilo ien eo, ri utiej ro im scientist ro rar kwelok ibben ri Bikini i Kili im konono ibbeir kin melele ko ilo book eo.

Book in ej kemelele kin tōbrak in joñok ko ilo 1978 ikijjen ailiñ kein: Rongelap, Utrik, Taka, Bikar, Rongrik, Ailinginae, Likiep, Ailuk, Jemo, Mejit, Wotho, im Ujelang. Ej kemeleleik ta in "radiation," im kin men jiddrik ko (reradioactive) rar walok jen atomic bomb ko, im kin joñan air ajeje ilo bwirejin ailiñ kein kajjojo. Book in ej bareinwōt kwalok kin joñan radiation armij remaroñ bwelen bōke kiō im tokelik jen atom ko reradioactive im rej bed wōt ilo ailiñ ko rej jokwe ie.

Kien eo an United States ear kōtōbrak melele kein ñōn an lilok ñōn armij in ailiñ kein kajjojo, bwe ren melele kin joñan radiation ilo ailiñ eo air rainin. Jet ian melele ko ilo book in renañin einlok wōt melele ko ilo book kein: "Ailiñ in Enewetak Rainin" im "Melelen Radiation ilo Ailiñ in Bikini." Ilo book in, eor jet nan im jet pija ko roktak jen ko ilo book ko ruo iman. Unin, kinke melele kein remwilōl ren alikkartok ño an armij riti, bareinwōt ñōn uaki kajjitōk ko rar walok elikin book ko ruo iman.



Introduction

Between 1946 and 1958 the United States government tested atomic bombs at Bikini Atoll and at Enewetak Atoll. During the time they were testing, they began examining some atolls in the Marshall Islands so that they could gather information about the amount of radiation at those atolls, and these studies are continuing. Scientists took samples of soil and water and also samples of food-bearing plants and sea life and land life in order to determine which kinds of radioactive atoms were in these things, and they also measured the amounts of these radioactive atoms. They also flew aircraft over the islands and measured the amounts of radiation there with instruments. Scientists have written many reports in English about the information that has been gained from these studies. These reports have been printed in books so that anyone in the world can read them.

From 1972 to 1979, scientists again studied Enewetak Atoll and they gained more knowledge about that atoll. This information is contained in the book "The Enewetak Atoll Today," which was printed in the Marshallese language and given to the people of Enewetak in 1979. Officials and scientists met with the Enewetak people at Ujelang and talked with them about the information in the book. Studies of Enewetak Atoll are continuing.

In 1978 the U.S. government examined these atolls in the northern part of the Marshall Islands: Rongelap, Utrik, Taka, Bikar, Rongrik, Ailinginae, Likiep, Ailuk, Jemo, Mejit, Wotho, Ujelang and Bikini. The reason scientists chose these atolls to study was because it is possible they were in the path the winds blew during some of the tests, and also because some information had been achieved previously about the radioactive atoms on some of these atolls. It was clear that the amount of ash and tiny things from the bombs [fallout] was not the same on each of these atolls, therefore the U.S. government wanted to know more precisely how much radiation there was on each of these atolls. They again flew over the islands and measured the amounts of gamma radiation that came from them. They filled more than 5,000 small plastic bags with samples of soil, water, food from plants, sea and land life, and made more than 19,000 measurements of these samples.

The information obtained regarding Bikini Atoll is in the book titled "The Meaning of Radiation at Bikini Atoll," which was printed in the Marshallese language and given to the people of Bikini in 1980. At that time officials and scientists met with the Bikini people at Kili and talked with them about the information in the book.

This book explains the results of the 1978 measurements for the following atolls: Rongelap, Utrik, Taka, Bikar, Rongrik, Ailinginae, Likiep, Ailuk, Jemo, Mejit, Wotho and Ujelang. It explains the meaning of radiation, and about the tiny (radioactive) things that came from the atomic bombs, and about their distribution in the soil of each of these atolls. Also, this book gives [information about] the amounts of radiation people might receive now and later from radioactive atoms that remain on the atolls where they live.

The U.S. government compiled this information to give to the people of each of these atolls so they can understand about the amount of radiation at their atoll today. Some of the information in this book is very much like the information in the books, "The Enewetak Atoll Today," and "The Meaning of Radiation at Bikini Atoll." In this book, some words and some pictures are different from those in the former two books. The reason is so that this complex information will be clearer for people to read, and also to answer questions raised following the first two books.



Chapter 1: Tibdrikdrik im Atom ko Reradioactive jen Atomic Bomb ko

Kien eo an United States ear kōkōmmālmel kin 23 atomic bomb ko ilo ailiñ in Bikini im kin 43 atomic bomb ko ilo ailiñ in Enewetak jen 1946 ñōn 1958. Rar kōkōmmālmel ilomalo, ion tōkā ko, imejatoto, im ion jet ian ene ko.

Ñe eor kōkōmmālmel kin atomic bomb ko, ekanuij in lōñ atom ko reradioactive rej walok. Page in ej kemelele kin ta ko rej walok elikin an juōn atomic bomb rup im ebboklok. Im page kane tok jet ilo book in rej kwalok melele ko kin atom ko reradioactive im kin radiation.

Ñe juōn atomic bomb ej rup im ebboklok, ej bōkliñlok bwirej, drekā, wōd, dren, im men ko eirluk wōt. Men kein rej koba ibben atom ko reradioactive jen bomb eo. Emōkaj an men kein otemjej kāliñlok ñōn ijoko reutiej ilo mejatoto im bar bellōltak. Ilo ailiñ in Bikini im ilo ailiñ in Enewetak, atom ko reradioactive im tibdrikdrikin bomb ko rar kōkōmmālmel kaki rar wōtlok ion ene ko, ilomalo, ilometo, im kōto ko rar bookilok jet ñōn United States, im lōl ko jet rettolo. Scientist ro rar kajjeon kōkōmmālmel kin bomb ko ilo ien ko rar tōmak ke kōto ko renaj maron bookilok atom ko reradioactive jen ailiñ in Majōl im ailiñ ko jet elōñ armij ie. Ijoke ilo jet ien kōkōmmālmel ko, kōto ko reutiejtata imejatoto rar booki atom ko reradioactive lok ñōn jet ian ailiñ ko ituiōñ ilo Majōl. Bareinwōt elikin an juōn bomb eo ekanuij in kajur kar ebboklok, ar oktak kōto ko im bookilok elōñlok atom ko reradioactive ñōn jet ian ailiñ ko ituiōñ ilo Majōl.

Bar juōn unin an lōñlok atom ko reradioactive rar wōtlok ion jet ian ailiñ ko ituiōñ ilo Majōl jen ko jet: kinke ejjab juōn wōt kain bomb ko im ejjab wāwen wōt juōn air kar kōkōmmālmel kaki, im kinke jet ien rar kōkōmmālmel ilo ailiñ in Bikini ak jet ien ilo ailiñ in Enewetak.

Atom ko reradioactive rej koba ibben bwirej im dren. Jet rej bed ilo mejatoto im armij rej emmenonoiki, kab ilo mōñā ko rej kañi im ilo dren ko rej ilimi. Melele ko rellaplok ikijjen men kein rebed ilo page kane tokelik.

Chapter 1: Tiny Particles and Radioactive Atoms from Atomic Bombs [Fallout]

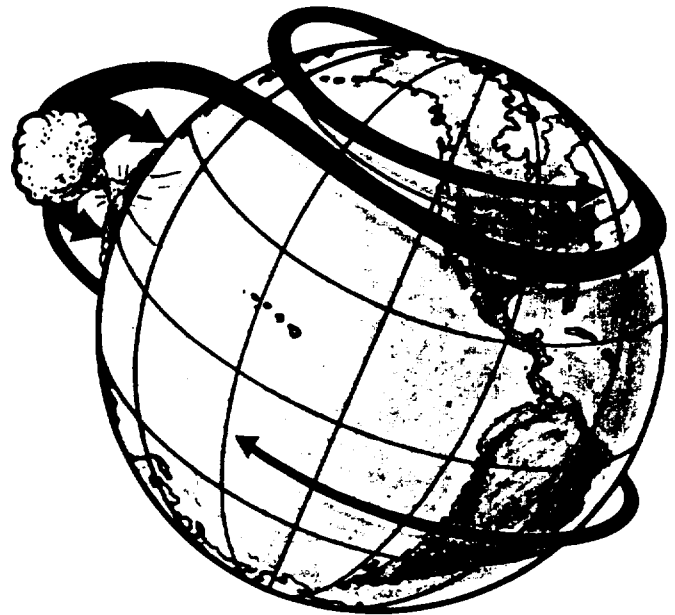
The United States government tested 23 atomic bombs at Bikini Atoll and 43 atomic bombs at Enewetak Atoll from 1946 to 1958. They conducted tests in the lagoons, on the reefs, in the air, and on some of the islands.

When atomic bombs are tested, very many radioactive atoms are produced. This page explains about what happens after an atomic bomb explodes. And the pages which follow in this book give information about radioactive atoms and radiation.

When an atomic bomb explodes, it takes up soil, rocks, coral heads, water, and other such things. These things join with the radioactive atoms from the bomb. All of these things rise quickly high into the air and then later fall back down. At Bikini Atoll and at Enewetak Atoll, the radioactive atoms and tiny particles from the bombs that were tested fell on the islands, in the lagoons, in the ocean, and the winds blew some to the United States and other countries far away. The scientists tried to test the bombs at times they believed the winds would be able to blow the radioactive atoms away from the Marshall Islands and other islands where people were. However, at some of the test times, the winds very high in the sky blew radioactive atoms toward some of the atolls in the northern part of the Marshall Islands. Also after one very powerful bomb exploded, the winds changed and blew more radioactive atoms to some of the atolls in the northern part of the Marshalls.

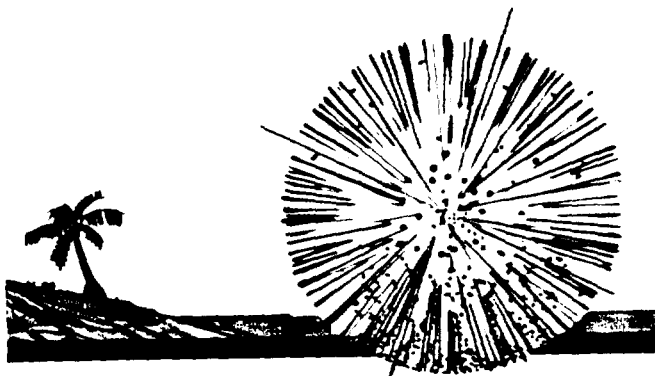
Another reason that more radioactive atoms fell on some of the atolls in the northern part of the Marshalls than on others is because there were different kinds of bombs, and they were not tested in the same ways, and because sometimes they were tested at Bikini Atoll and at other times at Enewetak Atoll.

Radioactive atoms mix with soil and water. Some are in the air people breathe and in the food they eat and in the water they drink. More detailed explanation about these things is contained in the following pages.



Tibdrikdrik im atom ko reradioactive jen atomic bomb ko rar wōtlok ion ailiñ in Bikini im Enewetak im ion jet ian ailiñ ko rar jejjete kōto eo, im bareinwōt ion jikin ko rettolo ibelakin lōl in.

The tiny particles and radioactive atoms from the atomic bombs fell on Bikini Atoll, on Enewetak Atoll, on some of the atolls in the path of the wind, and also on places far away around the world.

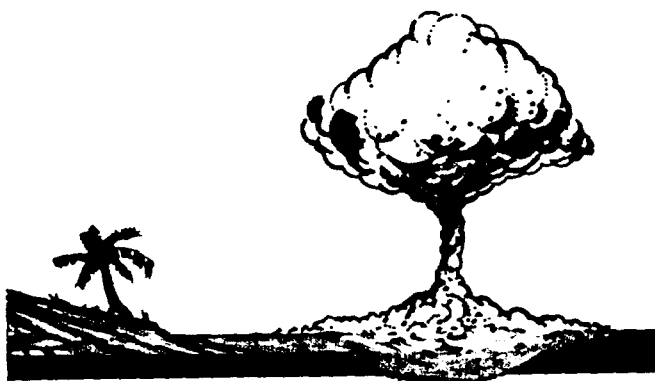


Edreboklok in juōn atomic bomb

Explosion of an atomic bomb

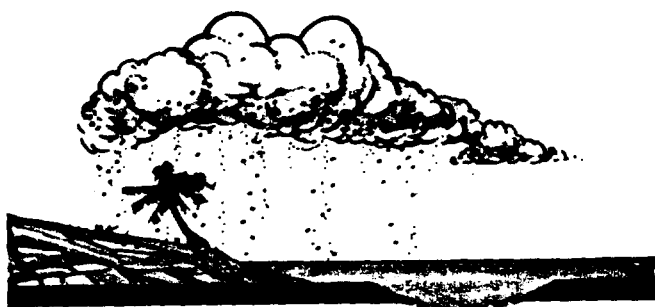
Tibdrikdrikin jabrewōt men ko rebake bomb eo im atom ko reradioactive jen bomb eo rej koba ibben dron.

Tiny particles of anything near the bomb and radioactive atoms from the bomb mix together.



Tibdrikdrik im atom ko reradioactive rej belliñlok.

The tiny particles and atoms that are radioactive rise upward



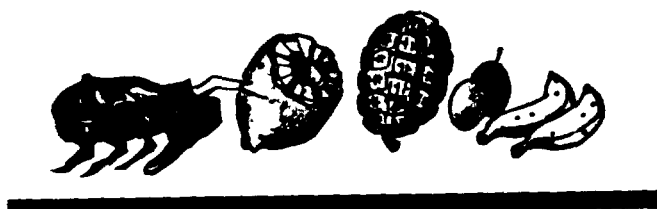
Tibdrikdrik im atom ko reradioactive rej bar wōtllok lōltak—jet ion lojet, jet ion ene ko rebak, im jet ñōn ijoko rettolo.

The tiny particles and atoms that are radioactive again fall down toward earth—some on the ocean, some on nearby islands, and some on places far away



Iumin elōñ yiō ko, tibdrikdrik im atom ko reradioactive rej wōnlōllok ibulōn bwirej. Jet atom ko reradioactive ilo bwirej rej dreloñ ilo mōñā ko.

Over a period of many years, the tiny particles and atoms that are radioactive go down into the soil. Some radioactive atoms in the soil enter food



Elañe armij rej mōñā mōñā ko elōñ atom ko reradioactive ie im emmenonoiki buñal ko elōñ atom ko reradioactive ie, atom kein reradioactive renaj dreloñ enbwinnier.

If people eat food that contains radioactive atoms and breathe dust that contains radioactive atoms, the radioactive atoms enter their bodies



*Pija in ej kwalok juōn roñ kōmmōn jen atomic
bomb ilo ailiñ in Bikini.*

This picture shows a crater made by an atomic bomb at Bikini Atoll



Enewetak

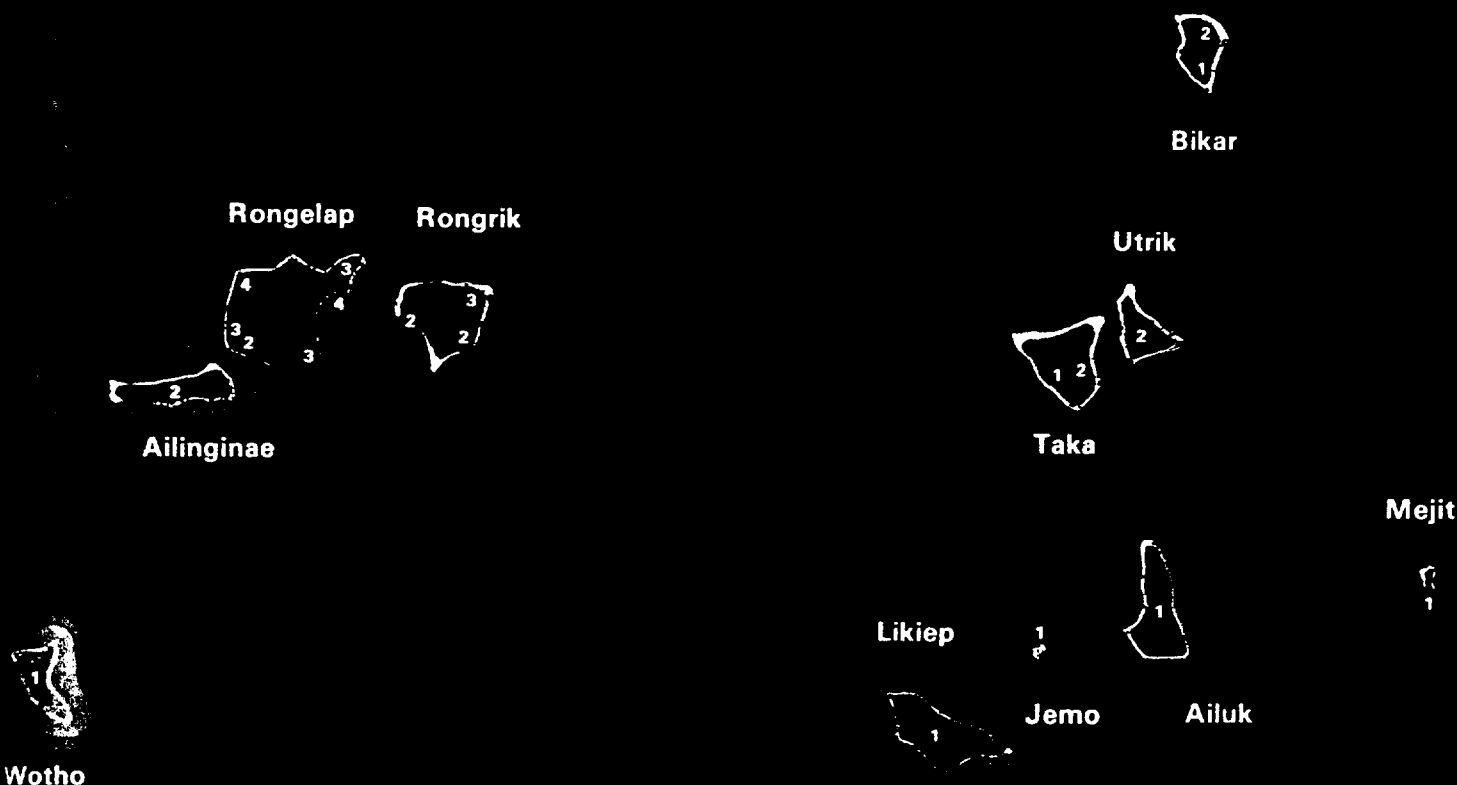


Bikini

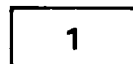
Ujelang



Map in ej kwalok ene ko ilo ailiñ ko ituiōñ ilo Majōl im Kien eo an United States ear etali ilo 1978. Jet ian ene kein elaplok joñan atom ko reradioactive ie jen ene ko jet. Unin, kinke jet ian ene ko ilo ailiñ in Bikini im ailiñ in Enewetak rej ijo rar kōkōmmālmel bomb ko ie. Bareinwōt kōto ar bookilok atom ko reradioactive im tibdrikdrikin bomb ko ñōn ene ko ilo ailiñ ko jet ituiōñ ilo Majōl.

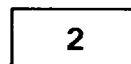


This map shows the islands in the northern part of the Marshall Islands that the U.S. government surveyed in 1978. Some of these islands have more radioactive atoms on them than others. The reason is because some of the islands at Bikini Atoll and Eniwetok Atoll are where they tested the bombs. Also the wind blew radioactive atoms and tiny particles of the bombs to islands in other atolls in the northern part of the Marshall Islands.



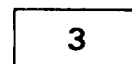
*Edriktata joñan
atom ko re-
radioactive ie*

*The least amount
of radioactive
atoms*



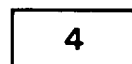
*Edrik joñan
atom ko re-
radioactive ie*

*A small amount of
radioactive atoms*



*Elaplok joñan
atom ko re-
radioactive ie*

*A larger amount of
radioactive atoms*



*Elaptata joñan
atom ko re-
radioactive ie*

*The largest
amount of
radioactive atoms*

Chapter 2: Men ko Reradioactive kab Juōn Kajur eo Etan Radiation

Men ko Reradioactive

Men otemjej ilo lōl in rej ejak jen bwijin men ko rekanuij in iddrik. Joñan air iddrik jejjab maroñ in loi. Rej naetan men jiddrik kein "atom." Jet ian atom kein rejenolok kinke remaroñ oktak im erom bar jet kain atom ko. Atom kein im remaroñ oktak scientist rej naetair "atom ko reradioactive." Ilo lōl in ekanuij lōñ oran atom ko rejjab maroñ oktak (melelen rejjab radioactive) jen atom ko remaroñ oktak (melelen reradioactive).

Ilo an juōn atom eo eradioactive oktaklok wōt ewalok juōn kain kajur jene eo jejjab maroñ in loe. Etan kain kajur in, "radiation." Ñe edredrelok an juōn atom oktak, kajur in ejako jene. (Nan ko renaj kemeleleiklok radiation rebed ilo page 13.)

Eor ian atom ko reradioactive rar baj bed wōt im mōttan lōl in, im ekanuij to bwe ren jako. Etan jet iair: potassium, uranium, im radium. Elōñ ilo bwirej, ilo dren, ilo mejatoto, ilo keinikkan im menin eddrek ko jet, ilo menin mour in lojet im ko ion ene, im bareinwōt ilo enbwinnin armij.

Potassium ej juōn ian kain in atom ko im rar baj bed wōt ilo lōl in, ijoke ekanuij lōñlok atom in potassium ko rejjab radioactive jen ko reradioactive. Potassium ej juōn menin aikwij ñōn mour im ej bed ilo men ko otemjej rej mour im bareinwōt ilo drekā ko im bwirej. Atom in potassium ko reradioactive rejamin jako iumin taujin million yiō ko.

Bar juōn kain atom eradioactive im ear baj bed wōt ilo lōl in etan in, uranium. Uranium ebed ilo elōñ kain drekā im bwirej ibelakin lōl in im edrik joñan ilo wōd. Uranium ejamin jako iumin taujin million yiō ko. Ilo an atom in uranium oktaklok, rej erom bar jet kain atom ko reradioactive im etan juōn iair radium. Eor atom in radium ilojet, ilo wōd ko, im ilo bwirej. Toan wōt an uranium bed, enaj wor wōt radium.

Ebareinwōt wor atom ko reradioactive rar walok jen atomic bomb ko. Jet ian atom kein ekar mōkaj air oktak (iumin jet minute ak ran ak wik) im ebwijrak an walok radiation jeni, innem atom kein im rar walok ilo ien kōkōmmālmel ko an United States rejako ilo ailiñ in Majōl rainin. Ak atom ko jet im reradioactive erumwij air oktak, im

jet iair rebed ilo jet jikin ko ituiōñ ilo Majōl ñōn rainin, im ej walok wōt radiation jeni. Etan kain atom kein reradioactive jen bomb ko im elap tokjen bwe jen jelā kaki irkein: iodine, cobalt, cesium, strontium, americium, im plutonium.

Aolep atom in americium im plutonium ilo lōl in reradioactive, ak elap an lōñlok atom in iodine, cobalt, cesium, im strontium ilo lōl in ko rejjab radioactive jen ko reradioactive.

Elōñ kain atom in iodine ko reradioactive, im enañin aolepeir emōkaj air oktak, im iodine rot kein rejako ilo ailiñ in Majōl rainin. Bar juōn kain atom in iodine eradioactive erumwij an oktak, bōtab ekanuij in drik joñan radiation eo ej walok jene.

Joñan atom in cobalt ko reradioactive ej driklok ien otemjej, im elikin 5 yiō ejako jimōttanin, im bar elikin 5 yiō ebar jako jimōttanin ijo ear bed wōt, im wāwen drein an naj driklok wōt joñan atom in cobalt ko reradioactive. Joñan radiation eo ej walok jen cobalt ebareinwōt driklok ilo an atom kein oktak im jakolok.

Joñan atom in cesium im strontium ko reradioactive ej driklok ien otemjej, im elikin 30 yiō ejako jimōttanier, im bar elikin 30 yiō ebar jako jimōttanin ijo ear bed wōt. Wāwen drein an driklok wōt joñan atom in cesium im strontium ko reradioactive. Joñan radiation eo ej walok jen cesium im strontium ebareinwōt driklok ilo an atom kein oktak im jakolok.

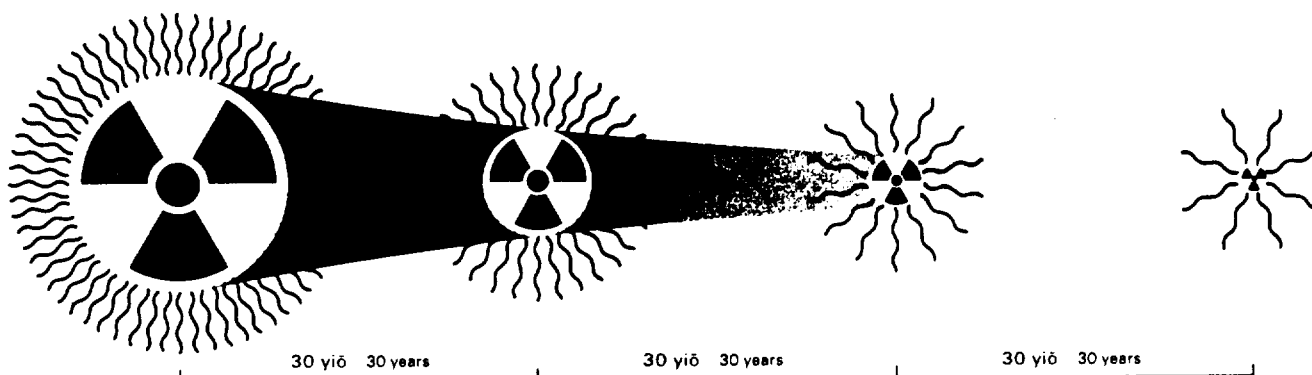
Joñan atom in americium ej driklok ien otemjej, bōtab erumwij an driklok, im elikin 430 yiō ejako jimōttanin, im bar elikin 430 yiō ebar jako jimōttanin ijo ear bed wōt. Wāwen drein an driklok wōt joñan atom in americium. Enaj walok wōt radiation jen americium iumin jet wōt taujin yiō.

(Melele kein rej wōnmanlok ilo page 13.)



Scientist in lōl otemjej rej kejerbal kakōlle in ñōn kajur eo naetan radiation.

Scientists of every country use this as a symbol for the energy called radiation.



Pija in ej kwalok wâwen an driklok joñan atom ko reradioactive, im ej wanjoñok kin strontium. Ilo an kakölle kein driklok wôt, im ilo an meralok uno kan pija in, ej kwalok wâwen an driklok wôt joñan atom in strontium ko reradioactive iumin yîö im yîö Drettan kakölle kein ej kalikkar joñan atom ko reradioactive rej bed elikin 30 yîö otemyej

Oran lain ko ibelakin kakölle kein rej einwôt joñan kajur eo ej walok jen atom ko reradioactive. Ilo an oran lain ko ibelakin kakölle kein retlok, ej kalikkar an driklok joñan kajur eo ej walok jen strontium iumin yîö im yîö. Jimöttanin strontium kab jimöttanin kajur eo ej walok jene enaj jako iumin 30 yîö ljo ebed enaj bar jako jimöttanin iumin bar 30 yîö, im wâwen drein manlok.

This picture shows the way the amount of radioactive atoms decreases, and gives strontium as an example. As these symbols diminish in size, and the color in the picture gets lighter, it illustrates the way the amount of radioactive strontium atoms continues to decrease over a period of years. The size of these symbols illustrates the amounts of radioactive atoms remaining after every 30 years.

The number of lines around these symbols is like the amount of energy that comes from the radioactive atoms. The diminishing number of lines around these symbols shows that the amount of energy that comes from strontium decreases over a period of years. One-half of the strontium and one-half of the energy that comes from it will be gone during 30 years. Half of that which remains will be gone during another 30 years, and this process continues on like this indefinitely.

Chapter 2: Things That Are Radioactive and an Energy Called Radiation

Things That Are Radioactive

Everything in the world is made from many very tiny things. They are so tiny that we cannot see them. These tiny things are called "atoms." Some of these atoms are set apart (distinct) because they can change and become other kinds of atoms. Scientists call these atoms that can change "radioactive atoms." In the world there are many more atoms that cannot change (meaning they are not radioactive) than there are atoms that can change (meaning they are radioactive).

As a radioactive atom changes, a kind of power [energy] that we cannot see comes from it. This kind of energy is called "radiation." When an atom has completely changed, this energy is gone from it. (Further explanation of radiation appears on page 13.)

Of the atoms that are radioactive, some have always been in the world and a part of the world, and it will take a very long time before they go away. The names of some of these are: potassium, uranium, and radium. They are in soil, in water, in air, in food-bearing plants and other plants, in animals of the sea and land, and also in people's bodies.

Potassium is one of these kinds of atoms that has always been in the world, however, there are many more atoms of potassium that are not radioactive than those that are radioactive. Potassium is necessary for life and is in all living things and also in rocks and soil. The radioactive atoms of potassium will not disappear for thousands of millions of years.

Another kind of radioactive atom that has always been in the world is called uranium. Uranium is in many kinds of rocks and soil around the world and a small amount is in coral. Uranium will not disappear for thousands of millions of years. As uranium atoms change, they become other kinds of radioactive atoms, and the name of one of them is radium. There are atoms of radium in the ocean, in coral, and in soil. As long as uranium exists so will radium.

There are also radioactive atoms that came from the atomic bombs. Some of these atoms changed quickly (during just a few minutes or days or weeks) and radiation has stopped coming from them, so these atoms that came from the U. S. bomb tests are no longer in the Marshall Islands today. But other radioactive atoms change slowly and some of these are still present in some places in the northern part of the Marshall Islands, and radiation is still coming from them. The names of these kinds of radioactive atoms from the bombs that are important for us to know about are: iodine, cobalt, cesium, strontium, americium, and plutonium.

All americium and plutonium atoms in the world are radioactive, but there are many more atoms of iodine, cobalt, cesium, and strontium in the world that are not radioactive than those that are radioactive.

There are several kinds of radioactive iodine atoms, and almost all of them change quickly, and these kinds of iodine are gone from the Marshall Islands today. Another kind of radioactive iodine atom changes slowly, but only a very small amount of radiation comes from it.

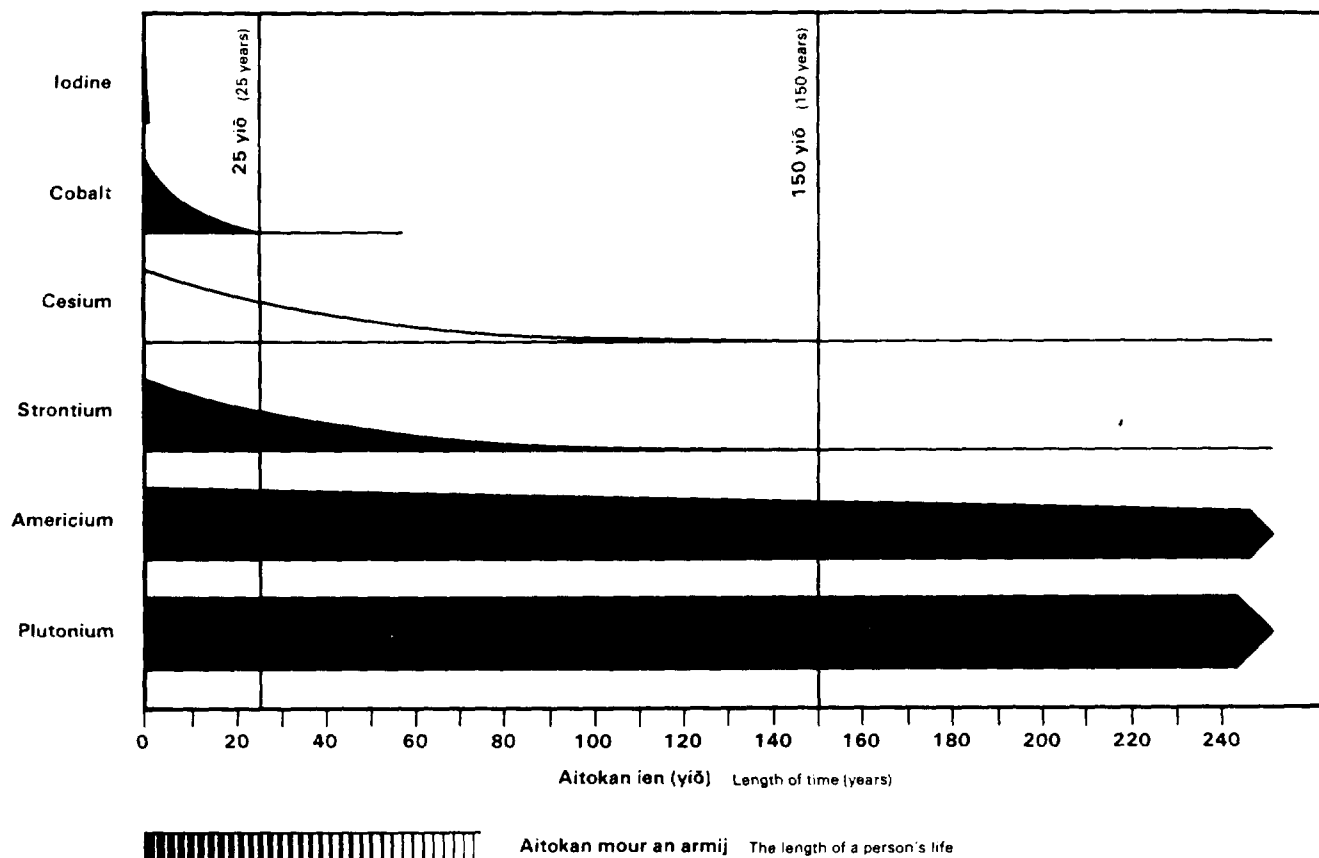
The amount of radioactive cobalt atoms decreases all the time, and after 5 years one-half is gone, and after another 5 years half of that which remained also disappears, and in this way the amount of radioactive cobalt atoms keeps decreasing. The amount of radiation that comes from the cobalt also decreases as these atoms change and keep disappearing.

The amount of radioactive cesium and strontium atoms decreases all the time, and after 30 years one-half is gone, and after another 30 years half of that which remained also disappears, and in this way the amount of radioactive cesium and strontium atoms keeps decreasing. The amount of radiation that comes from the cesium and strontium also decreases as these atoms change and keep disappearing.

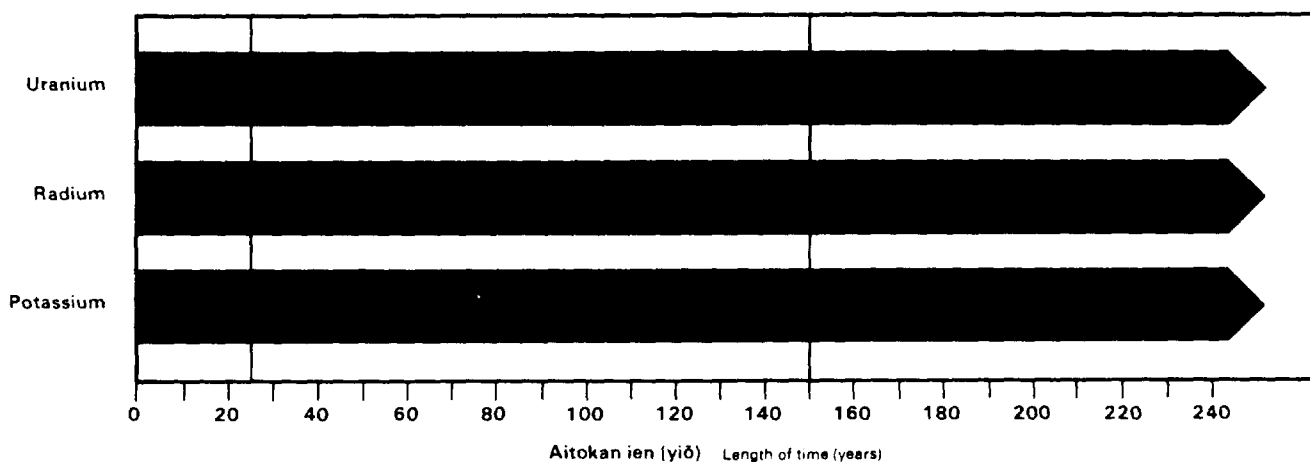
The amount of americium atoms decreases all the time, however, it decreases slowly, and after 430 years one-half is gone, and after another 430 years half of that which remained also disappears, and in this way the amount of radioactive americium atoms keeps decreasing. Radiation will continue to come from americium for a few thousand years.

(This information continues on page 13.)

Atom ko Reradioactive im rar Itok jen Atomic Bomb ko Radioactive Atoms From the Atomic Bombs



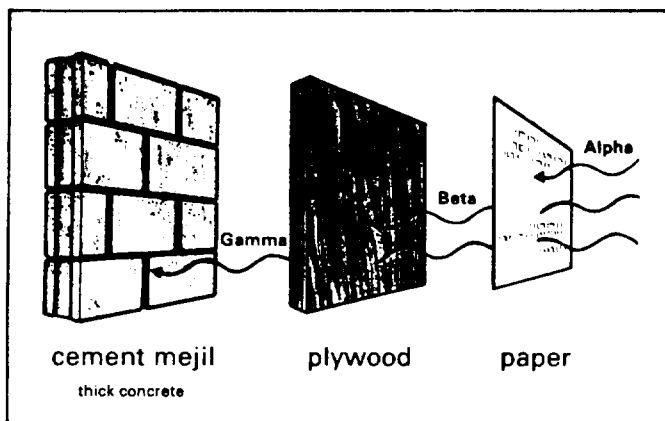
Atom ko Reradioactive im rar baj mōttan wōt lōl in jen jinoin Radioactive Atoms That Have Always Been in the World



Pija in ilin ej kwalok jete yiō atom kein reradioactive renaj oktak im erom atom ko rejjab radioactive. Jemaron keidri aitokan an atom kein reradioactive bed nōn aitokan an armij mour, eo ekkā wōt an 75 yiō. Iodine ejako elikin jet wōt allin. Elikin 25 yiō, joñan cobalt eo ej bed wōt enaj kanuij in drik. Elikin 150 yiō, enaj drik joñan cesium im strontium ko rebed wōt. Enaj jidrik wōt an driklok joñan americium iumin buki buki yiō ko, im bareinwōt enaj jidrik wōt an driklok joñan plutonium iumin elōñ taujin yiō ko. Ak joñan atom in potassium im uranium im radium ko

reradioactive im rar baj bed wōt ilo lōl in enaj jidrik wōt air driklok iumin taujin million yiō ko.

The picture above shows how many years it will take for these radioactive atoms to change and become atoms that are not radioactive. We can compare the length [of time] that these radioactive atoms exist to the length of a person's life (about 75 years). Iodine is gone after a few months. After 25 years, the amount of cobalt remaining will be very small. After 150 years, the amount of cesium and strontium remaining will be small. The amount of americium will only decrease a little over hundreds and hundreds of years, and the amount of plutonium will only decrease a little over many thousands of years. But, the amount of radioactive potassium, uranium, and radium atoms that have always been in the world will slowly decrease over thousands of millions of years.



Jet ian men ko remaroñ bōbrae jet kain in radiation ko

Some of the things that are able to stop some kinds of radiations

Joñan atom in plutonium ej driklok ien otemjej, bōtab ekanuij rumwij an driklok, im elikin 24,000 yiō ejako jimōttanin, im bar elikin 24,000 yiō ebar jako jimōttanin ijo ear bed wōt. Wāwen drein an driklok wōt joñan atom in plutonium. Enaj walok wōt radiation jen plutonium iumin elōñ taujin yiō.

Book in ej kemelele kin atom in cobalt, cesium, strontium, plutonium, im americium ko rar walok jen atomic bomb ko im rej bed wōt ilo ailiñ ko ituiōñ ilo Majōl. Enañin aolepeir rar walok jen atomic bomb ko United States ear kōkōmmālmel kaki, im jet rar walok jen atomic bomb ko lōl ko jet rar kōkōmmālmel kaki ilo jikin ko jet ibelakin lōl in.

The amount of plutonium atoms decreases all the time; however it decreases very slowly, and after 24,000 years one half is gone, and after another 24,000 years half of that which remained also disappears, and in this way the amount of plutonium atoms keeps decreasing. Radiation will continue to come from plutonium for many thousands of years.

This book explains about atoms of cobalt, cesium, strontium, plutonium, and americium that came from the atomic bombs and are still in the atolls of the northern part of the Marshall Islands. Almost all of these came from atomic bombs the United States tested, and some came from atomic bombs other nations tested in other places around the world.

Juōn Kajur eo Etan Radiation

Kajur eo ej walok jen atom ko reradioactive ilo air oktaklok enañin einlok wōt meram in al ak bwil in kijeek, kinke ekabwe aolepen belakin ijo ej walok jene. Bareinwōt elaplok kajur eo ijoko rebake atom ko reradioactive, im ej mōjno liklok ijoko rettolo-klok jen atom ko reradioactive. Ijoke, einjuōnllok kajur eo ej walok jen atom ko reradioactive jen meram in al im bwil in kijeek kinke meñe je ebake ak jeban loe, roñjake, nemake, āt bwin, ak eñjake.

Eor jilu kain radiation rej walok jen atom ko reradioactive im rar baj bed wōt im mōttan lōl in, im bareinwōt jen atom ko reradioactive im rar walok jen ien kōkōmmālmel atomic bomb ko:

1. Alpha Radiation — Jet atom ko reradioactive rej kwalok alpha radiation. Ekadru ijo alpha radiation ej tōbare, bwelen 3 inch ibelakin atom ko ilo mejatoto; im juōn paper emaroñ kabwijrake.
2. Beta Radiation — Jet atom ko reradioactive rej kwalok beta radiation. Eaetoklok ijo beta radiation ej tōbare, bwelen 4 yard ibelakin atom ko ilo mejatoto; im men ko remejillok jen paper, einwōt plywood, remaroñ kabwijrake.
3. Gamma Radiation — Jet atom ko reradioactive rej kwalok gamma radiation. Elap an aetoklok ijo gamma radiation ej tōbare, bwelen 300 yard ibelakin atom ko ilo mejatoto; im men ko wōt remejil im bin, einwōt cement, drekā ko rellap, im jet kain māl (steel, lead) remaroñ kabwijrake.

An Energy Called Radiation

The energy that comes from radioactive atoms as they change is similar to the light of the sun or the heat of fire because it spreads all around wherever it comes from. Also the energy is greater in places close to radioactive atoms, and it gets weaker in places farther and farther from the radioactive atoms. However, the energy produced by radioactive atoms is different from the light of the sun and the heat of fire because even if we are close to it we cannot see it, hear it, taste it, smell it, or feel it.

There are three kinds of radiation that come from radioactive atoms that have always been in and part of the world and also from radioactive atoms that came from the atomic bomb tests.

1. Alpha Radiation - Some radioactive atoms give off alpha radiation. The place alpha radiation reaches is short, perhaps 3 inches surrounding the atoms in air, and a paper can stop it (its movement).
2. Beta Radiation - Some radioactive atoms give off beta radiation. The place beta radiation reaches is farther, perhaps 4 yards surrounding the atoms in air, and things thicker than paper, such as plywood, can stop it.
3. Gamma Radiation - Some radioactive atoms give off gamma radiation. The place gamma radiation reaches is very much farther, perhaps 300 yards surrounding the atoms in air; only those things that are thick and dense, such as concrete, huge rocks, and some kinds of metals (steel, lead) can stop it.

Kajur eo naetan alpha radiation jen atom ko reradioactive im rej bed jabrewōt jikin ibelakin juōn armij ejjab maroñ dribuk kilin armij im dreloñ ñōn enbwinnin. Kajur eo naetan beta radiation jen atom ko reradioactive im rej bed jabrewōt jikin ibelakin juōn armij emaroñ dribuk kilin, im enañin aolepen enaj tōbar wōt ijoko iomin kil. Ñe kajur eo naetan gamma radiation ej bed jabrewōt jikin ibelakin juōn armij, emaroñ dribuk kilin im dreloñ enbwinnin; elap wōt joñan radiation in ej driblok im driojlok jen enbwin, ak eor mōttan kajur in radiation in ej bwijrak wōt ilo enbwin.

Ijoke, atom ko reradioactive remaroñ dreloñ enbwinnin armij ilo mōñā ko rej mōñā kab ilo mejatoto eo rej emmenonoiki, im tōbar bōtōktōk, dri, ār, im mōttan ko jet ilo enbwin. Ilo an atom kein reradioactive bed ilolan enbwin im oktaklok wōt, ej walok alpha radiation, beta radiation, ak gamma radiation jeni. Radiation kein remaroñ tōbar dri, ār, im mōttan ko jet ilo enbwin.

Aolepen kajur eo jen alpha radiation im aolepen kajur eo jen beta radiation im mōttan kajur eo jen gamma radiation renaj bed wōt ilo enbwin. Kajur eo jen radiation kein im ej bed wōt ilo enbwin emaroñ bwelen kōmmōn jorrān, bōtab ekkā wōt an jab kōmmōn jorrān.



Radiation ej juōn men eo jeban loe, roñjake, nemake, āt bwin, im eñjake.

Radiation is something we can't see, hear, taste, smell, or feel.

Alpha radiation im beta radiation im gamma radiation rej walok wōt ilo Majōl im ilo jikin ko jet ibelakin lōl in jen atom ko reradioactive im rar baj bed im mōttan wōt lōl in. Ebar wor radiation ko rej itok jen al im iju ko im rej driblok enbwinnin armij. Jet ian radiation kein remaroñ bareinwōt kōmmōn jorrān.

Alpha radiation ej walok jen atom in uranium im radium ko rar baj bed wōt ilo lōl in. Ilo an atom in uranium im radium oktaklok, bar jet atom ko reradioactive rej walok. Alpha radiation, beta radiation, im gamma radiation rej walok jen atom kein rekāl im reradioactive. Beta radiation im gamma radiation rej bareinwōt walok jen atom in potassium ko reradioactive im rar baj bed wōt ilo lōl in. Meñe ekanuij drik joñan atom in potassium ko reradioactive ilo enbwinnin armij otemjej, ak ebwe ñōn an armij bōk jidrik joñan gamma radiation jen dron ñe rej ebake dron.

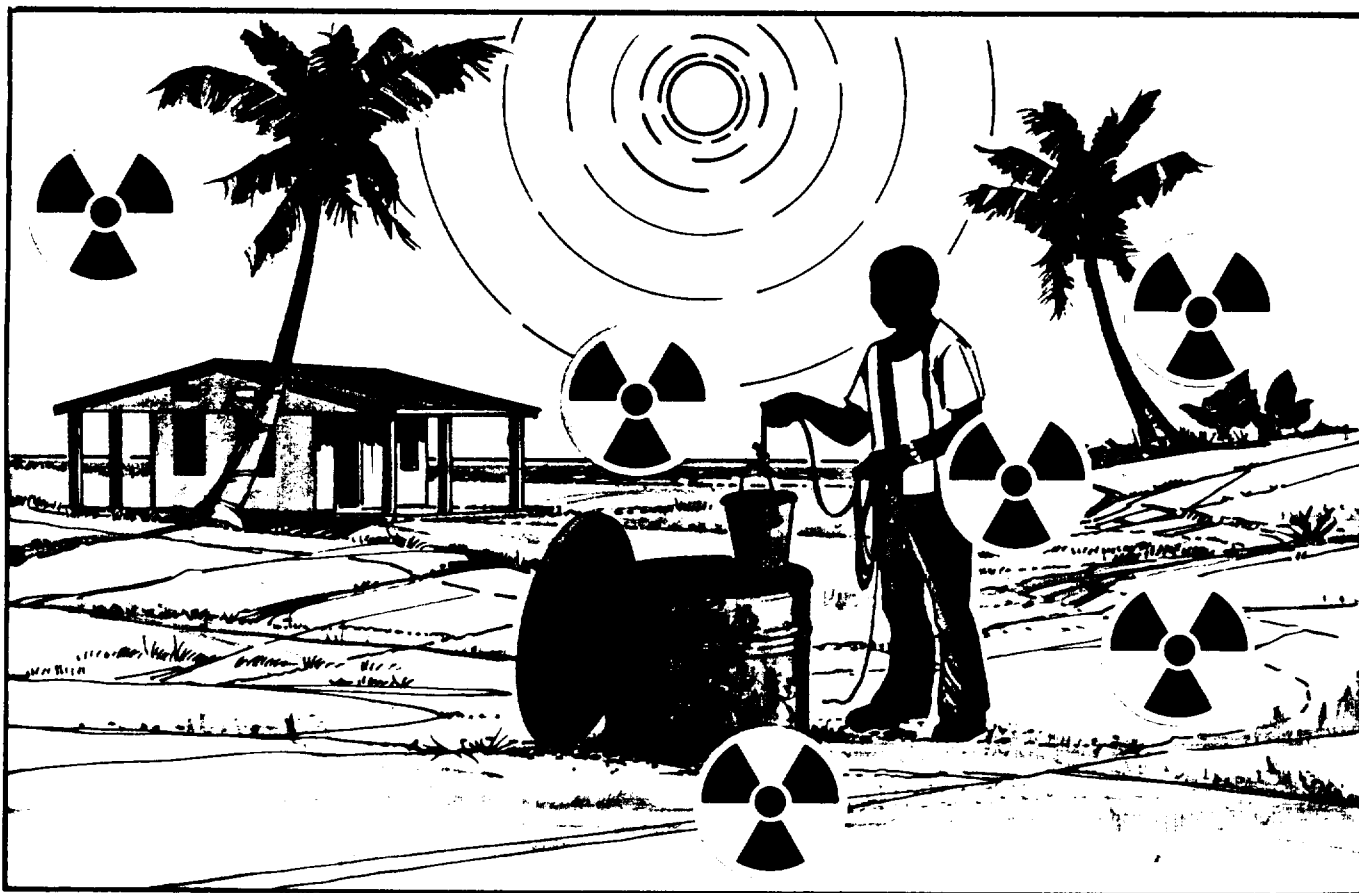
Etan bwinbwin ko scientist ro rej kejerbali ñōn joñe joñan radiation juōn armij ej bōke ilo enbwinnin ej "millirem." Ilo kajjojo yiō, armij ro rej jokwe ilo ailiñ in Majōl rej bōk tarrin 50 millirem in radiation jen al im iju ko im jen atom ko reradioactive im rar baj bed wōt ilo lōl in.

Ebar wor radiation ej walok wōt jen atom ko reradioactive im rej bed ilo ailiñ ko ituiōñ ilo Majōl, im bareinwōt ilo jabrewōt jikin ibelakin lōl in, ijoko melkwarar im tibdrikdrikin bomb ko rar wōtlok ie. Alpha radiation ej walok jen plutonium im americium; beta radiation ej walok jen cobalt, cesium, im strontium; gamma radiation ej walok jen cesium im cobalt im jidrik jen americium.

The energy called alpha radiation from radioactive atoms that are anywhere around a person cannot pass through the skin and enter the body. The energy called beta radiation from radioactive atoms anywhere around a person can pass through the skin and almost all of it will reach the area just under the skin. When the energy called gamma radiation is anywhere around a person it can pass through the skin and enter his body; most of this radiation passes through people's bodies, but part of the energy from this radiation stops inside the body.

However, radioactive atoms may enter people's bodies in the food they eat and in the air they breathe and can reach the blood, bones, lungs, and other parts of the body. While these radioactive atoms are inside the body and continue to change, alpha radiation, beta radiation, or gamma radiation comes from them. These radiations can reach the bones, lungs, and other parts inside the body.

All the energy from alpha radiation and all of the energy from beta radiation and a part of the energy from gamma radiation will remain in the body. The energy from these radiations that remains in the body might cause harm; however, usually it does not cause harm.



Alpha radiation and beta radiation and gamma radiation occur in the Marshall Islands and in other places around the world from radioactive atoms that have always been in and part of the world. There are also radiations that come from the sun and stars and pass through people's bodies. Some of these radiations also may cause harm.

Alpha radiation comes from uranium and radium atoms that have always been in the world. As uranium and radium atoms change, other radioactive atoms are produced. Alpha radiation, beta radiation, and gamma radiation come from these new atoms that are radioactive. Beta radiation and gamma radiation also come from radioactive potassium atoms that have always been in the world. Even though the amount of radioactive potassium atoms in everyone's bodies is very small, it is enough for people to receive a small amount of gamma radiation from each other when they are close to each other.

The name of the numbers scientists use to measure the amount of radiation a person receives in his body is "millirem." Each year people who live in the Marshall Islands receive about 50 millirem of radiation from the sun and stars and from radioactive atoms that have always been in the world.

Radiation also comes from radioactive atoms that are at atolls in the northern part of the Marshall Islands and also everywhere else around the world where the ash and tiny particles from the bombs fell. Alpha radiation comes from plutonium and americium; beta radiation comes from cobalt, cesium, and strontium; gamma radiation comes from cesium and cobalt, and a little comes from americium.

Radiation ear baj bed wōt im mōttan lōl in. Eor atom ko reradioactive ilo mejatoto, ilojet, ilo aebōjlōl, ilo bwirej, ilo menin eddrek ko, ilo menin mour ko, im ilo enbwinnin armij, im radiation ej walok jen atom kein. Ebareinwōt wor radiation ej itok jen al im iju ko. Joñan radiation kein aolep im juōn armij ej bōke ilo an jokwe i Majōl ilo kajjo yīō ej tarrin 50 millirem.

Radiation has been in and part of the world. There are radioactive atoms in air, in salt water, in well water, in soil, in plants, in animals, and in people's bodies, and radiation comes from these atoms. There is also radiation that comes from the sun and the stars. The amount of all these radiations a person living in the Marshall Islands receives each year is around 50 millirem.



Chapter 3: Wāwen an Armij Maroñ Bōk Radiation

Armij remaroñ bōk radiation ilo ruo wāwen. Remaroñ bōk radiation jen atom ko reradioactive im rej bed ibelakin enbwinnier, im remaroñ bōk radiation jen atom ko reradioactive im rej bed iloan enbwinnier.

Radiation jen Belakin Enbwin

Gamma radiation, eo ej walok jen atom ko reradioactive ilo bwirej im ilo men ko jet, emaroñ tōbar aolep mōttan ko ilo enbwin. Elap wōt joñan radiation in ej driblok im driojlok jen enbwin, ak eor mōttan kajur in radiation in ej bwijrak wōt ilo enbwin. Radiation in, eo ej wōnliñtak jen bwirej, ej walok jen cesium, cobalt, radium, im potassium ko rebed ijoko rebijbij. Mōttan radiation eo jen atom kein reradioactive im rebed ilo bwirej ko remwilōl, ejjab maroñ tōbar enbwinnin armij kinke bwirej ko rebōbrae. Ejelok alpha radiation emaroñ tōbar enbwinnin armij jen atom ko reradioactive ilo bwirej, im jidrik wōt joñan beta radiation emaroñ tōbar enbwinnier jen atom kein, kinke bwirej ko rebōbrae.

Chapter 3: The Ways People Can Receive Radiation

People can receive radiation in two ways. They can receive radiation from radioactive atoms outside their bodies, and they can receive radiation from radioactive atoms that are inside their bodies.

Radiation from Outside the Body

Gamma radiation, which comes from radioactive atoms in the soil and in other things, can reach all parts of the body. Most of this radiation passes through people's bodies, but part of the energy from this radiation stops inside the body. This radiation that comes up out of the soil comes from the cesium, cobalt, radium, and potassium that are near the surface. Part of the radiation from these radioactive atoms that are in the deep soil cannot reach people's bodies because the soils stop it. No alpha radiation is able to reach people's bodies from the radioactive atoms in the soil, and only a small amount of beta radiation can reach their bodies from these atoms, because the soils stop them.



Lain kein retitil ilo pija in rej kwalok wāwen an atom ko reradioactive maroñ dreloñ ilo enbwinnin armij, im lain in eviolet ej kwalok wāwen an radiation maroñ dreloñ ilo enbwinnin armij. Elañe eor atom ko reradioactive ilo mejatoto, armij remaroñ emmenonoiki. Atom ko reradioactive ilo bwirej remaroñ dreloñ ñōn keinikkan ko innem dreloñ ñōn enbwinnin armij ilo air mōñā leen keinikkan kein. Ilo ejja wāwen in wōt, atom ko reradioactive remaroñ ilok jen bwirej ñōn keinikkan im jen keinikkan ñōn menin mour, innem jen menin mour ñōn enbwinnin armij. Radiation jen atom ko reradioactive ilo bwirej remaroñ dreloñ enbwinnin armij.

These lines with dots on them in this picture show how radioactive atoms can enter people's bodies, and this magenta line shows how radiation can enter people's bodies. If there are radioactive atoms in the air, people can breathe them. Radioactive atoms in soil can enter plants and then enter people's bodies when they eat these plants. In this same way, radioactive atoms can go from soil to plants and from plants to animals and then from animals to people's bodies. Radiation from radioactive atoms in the soil can enter people's bodies.

Radiation jen Loan Enbwin

Enañin aolepen atom ko reradioactive ilo enbwinnin armij rej itok jen men ko kijeir. Ñe armij rej mōñā leen keinikkan ko im kanniek ko elōñ atom ko reradioactive ie, atom kein rej bareinwōt dreloñ ilo enbwinnier. Ñe armij rej ilimi dren ko elōñ atom ko reradioactive ie, atom kein rej bareinwōt dreloñ ilo enbwinnier. Wāwen drein an atom ko reradioactive im rej mōttan wōt lōl in dreloñ ñōn enbwinnin armij, im ejja wāwen drein wōt an atom ko reradioactive jen ien kōkōmmālmel atomic bomb ko dreloñ ñōn enbwinnier.

Ñe elōñ atom ko reradioactive rej bed ion bwirej, jet ien kōto ej bookiliñlok ibben būñal ko ñōn mejatoto im armij rej emmenonoiki. Kab jet ien rej wōtlok ilo drennin idrak ko.

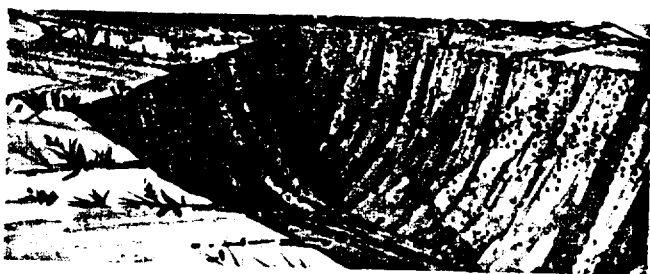
Joñan radiation armij rej bōke jen mejatoto im jen drennin idrak ko ekanuij driklok jen joñan radiation eo rej bōk jen mōñā ko rej kani. Eñin unin an lap tokjen bwe armij ren melele kin wāwen an men ko reradioactive dreloñ ilo mōñā ko.

Radiation from Inside the Body

Almost all of the radioactive atoms in people's bodies come from food. When people eat plants or animals that have radioactive atoms in them, these atoms also enter their bodies. When people drink water that has radioactive atoms in it these atoms will also enter their bodies. This is the way radioactive atoms that are a part of the world enter people's bodies, and it is also in this way that radioactive atoms from atomic bomb tests enter their bodies.

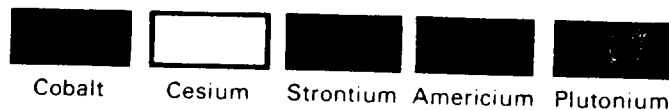
If there are radioactive atoms on the soil, sometimes wind blows these up with dust into the air and people breathe them. Also sometimes they fall on drinking water.

The amount of radiation people receive from the air and from what they drink is much smaller than the amount of radiation they receive from food they eat. This is why it is important for people to understand the ways that radioactive materials get into foods.



Atom ko reradioactive rebed ilo bwirej im rej dreloñ ñōn keinikkan im men ko leir, im bareinwōt ñōn menin eddrek ko jet im menin mour ko.

Radioactive atoms are in soil and they enter edible plants and their fruits and also other plants and animals.



Cobalt

Cesium

Strontium

Americium

Plutonium

Wāwen an Atom ko Reradioactive Dreloñ ilo Mōñā

Atom ko reradioactive jen atomic bomb ko Kien eo an United States ear kōkōmmālmel kaki ilo ailiñ in Bikini im ailiñ in Enewetak rar wōtlok ion bwirejin jet ian ailiñ ko ituiōñ ilo Majōl, ilomalo, im ilometo. Atom ko reradioactive im rar bed ion bwirej rar wōnlōllok ñōn bulōn bwirej. Pija in ilo page 18 ej kwalok ijoko atom ko reradioactive rebed ie ibulōn bwirej. Plutonium im americium rej emmakit lōllok ibben dren ko, bōtab ekanuij rumwij, innem eto air naj bed ilo bwirej jabeo ituliñ. Emōkajlok an cobalt, cesium, im strontium torlōllok ibben dren ko, innem rej bed ilo bwirej jab ko rebijbij im bareinwōt ko remwilōl.

Jet ian atom ko reradioactive ilo bwirej rej bed ijoko okaran menin eddrek ko rej eddrek ie. Menin eddrek otemjej rej bōk kijeir jen bwirej kin okarair. Ilo an menin eddrek kein bōk kijeir, jet ian atom ko reradioactive ilo bwirej rej bar wōnliñlok ibben mōñā kein ñōn ra ko, im ñōn men ko leir. Ñe menin mour ko einwōt pig, bao in mejatoto, im bao in lōl, renaj mōñā menin eddrek kein im men ko leir, renaj bareinwōt kañi atom ko reradioactive ie. Pija eo ilo page 18 ej kwalok wāwen an atom ko reradioactive wōnliñlok ilo kām ni ko im ñōn men ko leir. Ñe baru ko rej mōñā waini ko elōñ atom ko reradioactive ie, atom kein renaj bed ilolan baru ko. Elaplok an cesium im strontium dreloñ ilo leen menin eddrek ko, jen plutonium im americium.

Elōñ ian atom ko reradioactive im rar wōtlok ilomalo rar wōnlōllok ñōn kabin lomalo ko, ak jet rar bed wōt ilo drennin lojet. Enañin aolepen atom ko reradioactive ikibin lomalo rebed ilo lūm, im jet rebed ilo menin eddrek ko ilomalo. Ñe ek ko rej mōñā menin eddrek kein rej bareinwōt mōñā atom ko reradioactive ie. Jet atom ko reradioactive im rej bed ilo drennin lojet rar bareinwōt dreloñ ilo menin eddrek kein im jet ilo ek ko. Jabrewōt ien eo ej ibwijtok, drennin lometo ej dreloñtok im kakāl drennin lomalo. Ilo wāwen in, joñan atom ko reradioactive ilomalo im ilo men ko rej mour ie ej driklok wōt.

Kinke elap an lap dren ilometo, jidrik wōt joñan atom ko reradioactive im rar wōtlok ilometo rej dreloñ ilo ek ko.

Elap wōt an okaran keinikkan ko bōkliñlok atom ko reradioactive jen bwirej ñōn kām ko kab men ko leir, jen an men kein reradioactive dreloñ ilo kanniekin ek ko jen men ko kijeir kab drennin lojet. Melelen bwe edrik joñan atom ko reradioactive ilo ek ko jen joñan eo ilo leen keinikkan ko.

Scientist ro ilo Lawrence Livermore National Laboratory rar lo bwe joñan atom ko reradioactive ilo ek in ailiñ ko ituiōñ ilo Majōl enañin joñan wōt ko ilo ek ko ri America rej mōñā, im edrik jen joñan eo ilo ek ko armij ro ilo jet bar ailiñ rej mōñā.

Meñe armij renaj kematti mōñā ko elōñ atom ko reradioactive ie, ak atom kein renaj bed wōt im radiation enaj walok wōt jeni.

How Radioactive Atoms Enter Food

Radioactive atoms from U.S. atomic bomb tests at Bikini and Enewetak atolls fell on the soils of some of the atolls in the northern part of the Marshall Islands, in the lagoons, and in the ocean. The radioactive atoms that fell on the surface of the soil went down into the soil. The picture on page 18 shows the places where the radioactive atoms are within the soil. Plutonium and americium move down with water but very slowly, so they will remain in the soil near the surface for a long time. Cobalt, cesium, and strontium go down more rapidly with the water, and so they are in soils near the surface and also in soils that are deep.

Some of the radioactive atoms in the soil are in the places where the roots of plants grow. All plants get their food from the soil through their roots. As these plants get their food, some of the radioactive atoms in the soil also go up with the food to the branches and to the fruits. When animals such as pigs, birds, and chickens eat these plants or fruit they also eat the radioactive atoms in them. The picture on page 18 shows how radioactive atoms go up inside the trunks of the coconut trees and to their fruits. When coconut crabs eat the coconuts that have radioactive atoms in them, these atoms will be inside the crabs. More cesium and strontium enter the edible parts of plants than plutonium and americium.

Many of the radioactive atoms that fell in the lagoons settled to the bottom of the lagoons and some remained in the water. Most of the radioactive atoms in the bottom of the lagoons have gone into the mud and sand and some have gone into the plants in the lagoon. When fish eat these plants they also eat the radioactive atoms in them. Some radioactive atoms in the water have also gone into these plants and some into fish. Every time the tide comes in, ocean water enters and renews the lagoon water. In this way the amount of radioactive atoms in the lagoons and in the living things there keeps decreasing.

Because there is a very large quantity of water in the ocean, only a very small amount of the radioactive atoms that fell into the ocean go into fish.

The roots of plants take up more radioactive atoms from the soil into their stems and to their edible parts than fish take into their flesh from their food and salt water. This means that the amount of radioactive atoms in fish is less than the amount in the edible parts of plants.

The scientists at Lawrence Livermore National Laboratory found that the amount of radioactive atoms in fish in the northern part of the Marshall Islands is about the same as that in fish Americans eat, and is less than the amount in fish people of some other countries eat.

Even if people cook food that contains radioactive atoms, these atoms will still be there, and radiation will continue to come from them.



Irkein jet ian kain mōñā ko emaroñ bwelen wor atom ko reradioactive ie jen ien kōkōmmālmel atomic bomb ko.

These are some of the kinds of foods that might contain radioactive atoms from the bomb tests

Atom Ko Reradioactive Ilo Enbwinnin Armij Rej Ilok ñōn Mōttan Ko Kajjo Ilo Enbwin

Ñe armij rej mōñā mōñā ko elōñ atom ko reradioactive ie im idrak dren ko elōñ atom ko reradioactive ie, atom kein reradioactive rej ilok ñōn lojeir im mōjñalier. Enañin aolepen atom in cesium im potassium, im jet atom in strontium, cobalt, im radium renaj ilok jen mōjñal ñōn bōtōktōk. Bōtab jijjiddrikdrik wōt atom in americium, plutonium, im uranium renaj ilok jen mōjñal ñōn bōtōktōk. Aolepen atom ko reradioactive im rejjab ilok ñōn bōtōktōk rej driojlok jen enbwin elikin juōn ak ruo ran. Atom in cesium, cobalt, im potassium rej ilok jen bōtōktōk ñōn aolep mōttan ko ilo enbwin. Enañin aolepen atom in strontium, americium, plutonium, im radium im jet atom in uranium rej ilok jen bōtōktōk ñōn dri, im eor mōttan atom in americium im plutonium rej ilok jen bōtōktōk ñōn aj.

Atom in cesium, cobalt, im potassium, ko rar ilok jen mōjñal ñōn bōtōktōk im ñōn mōttan ko jet ilo enbwin ilo juōn wōt ran, renaj driojlok jen enbwin jidrik illok jidrik. Jimōttanier renaj driojlok jen enbwin iumin jet alliñ. Jimōttanin ijo ebed enaj bar driojlok iumin bar jet alliñ, im enaj eindrein manlok. Bōtab elañe armij renaj bar mōñā mōñā ko eor atom in cesium ak cobalt ak potassium ie, atom kein rekāl renaj bōk jikin atom ko emwij air driojlok jen enbwinnier. Atom kein rekāl renaj bareinwōt driojlok jen enbwin jidrik illok jidrik. Aolep mōttan ko ilo enbwin renaj bōk radiation jen atom kein reradioactive ñe rej bed iloan enbwin.

Jet ian atom in strontium, uranium, im radium ko rej ilok jen mōjñal ñōn bōtōktōk innem ñōn dri, renaj driojlok jen enbwin jidrik illok jidrik ilo an armij kebbojak, ak elōñ wōt renaj bed ilo dri iumin elōñ yiō. Elañe armij renaj bar mōñā mōñā ko elōñ strontium ak uranium ak radium ie, innem atom kein renaj bar kobalok ibben atom ko rar baj bed wōt iloan dri ko iumin elōñ yiō, im radiation enaj walok wōt jen atom kein reradioactive. Dri ko renaj bōk radiation jen atom kein reradioactive.

Jidrik wōt americium im plutonium renaj ilok jen mōjnal nōn bōtōktōk innem nōn dri im aj. Ekanuij iet oran atom in plutonium im americium ko renaj driojlok jen enbwīn ilo yīō in mour ko an juōn armij. Elaņe armij renaj bar mōñā mōñā ko elōñ atom in americium ak plutonium ie, jet ian atom kein renaj bar kobalok ibben atom ko rar bed wōt ilo dri im ilo aj. Dri ko im aj renaj bōk radiation jen atom kein reradioactive, ijoke enaj kanuij in drik joñan.

Ne armij rej emmenonoiki atom ko reradioactive ilo buñal imejatoto, atom kein rej ilok nōn ār. Enaņin aolepen buñal eo im atom ko reradioactive renaj driojlok jen ār im jen enbwīn, ak jet ian atom in cobalt, cesium, strontium, im potassium renaj ilok jen ār nōn bōtōktōk. Ekanuij driklok joñan atom in americium, plutonium, uranium, im radium enaj ilok jen ār nōn bōtōktōk. Ejja einwōt an atom ko reradioactive dreloñ ilo enbwīn ilo mōñā ko armij rej mōñā, atom in cesium, cobalt, im potassium rej bareinwōt dreloñ nōn ār ilo buñal eo armij rej emmenonoiki, im jen ār rej ilok nōn bōtōktōk im nōn aolepen mōttan ko ilo enbwīn. Enaņin aolepen atom in strontium im americium, plutonium, im radium im jet atom in uranium ko rej ilok jen ār nōn bōtōktōk rej ilok nōn dri; im eor mōttan atom in americium im plutonium rej ilok nōn aj. Mōttan atom in americium, plutonium, im uranium ko rej



Elaņe armij renaj mōñā jabrewōt mōñā ko elōñ atom ko reradioactive ie, atom kein renaj dreloñ ilo enbwīnnier.

If people eat any food that contains radioactive atoms, these atoms will enter their bodies

dreloñ ilo ār renaj bed wōt ilo ār iumin juōn ien eo ekanuij aetok, im radiation enaj walok wōt jen atom kein reradioactive. Edriklok joñan atom ko reradioactive renaj dreloñ nōn enbwīnnin armij ilo mejatoto eo rej emmenonoiki, jen joñan eo enaj dreloñ ilo mōñā ko rej kañi.

(Melele kein rej wōnmanlok ilo page 23.)

Radioactive Atoms in People's Bodies Go to Each Part of the Body

When people eat foods and drink water that have radioactive atoms in them, these atoms go to their stomachs and then to their intestines. Almost all of the atoms of cesium and potassium and some of the atoms of strontium, cobalt, and radium will go from the intestines to the blood. However, only a very, very small amount of atoms of americium, plutonium, and uranium will go from the intestines to the blood. After one or two days, the body will eliminate all of the radioactive atoms that do not go to the blood. Cesium, cobalt, and potassium atoms go from the blood to all parts of the body. Most of the atoms of strontium, americium, plutonium, and radium and some of uranium go from the blood to the bones, and some of the atoms of americium and plutonium go from the blood to the liver.

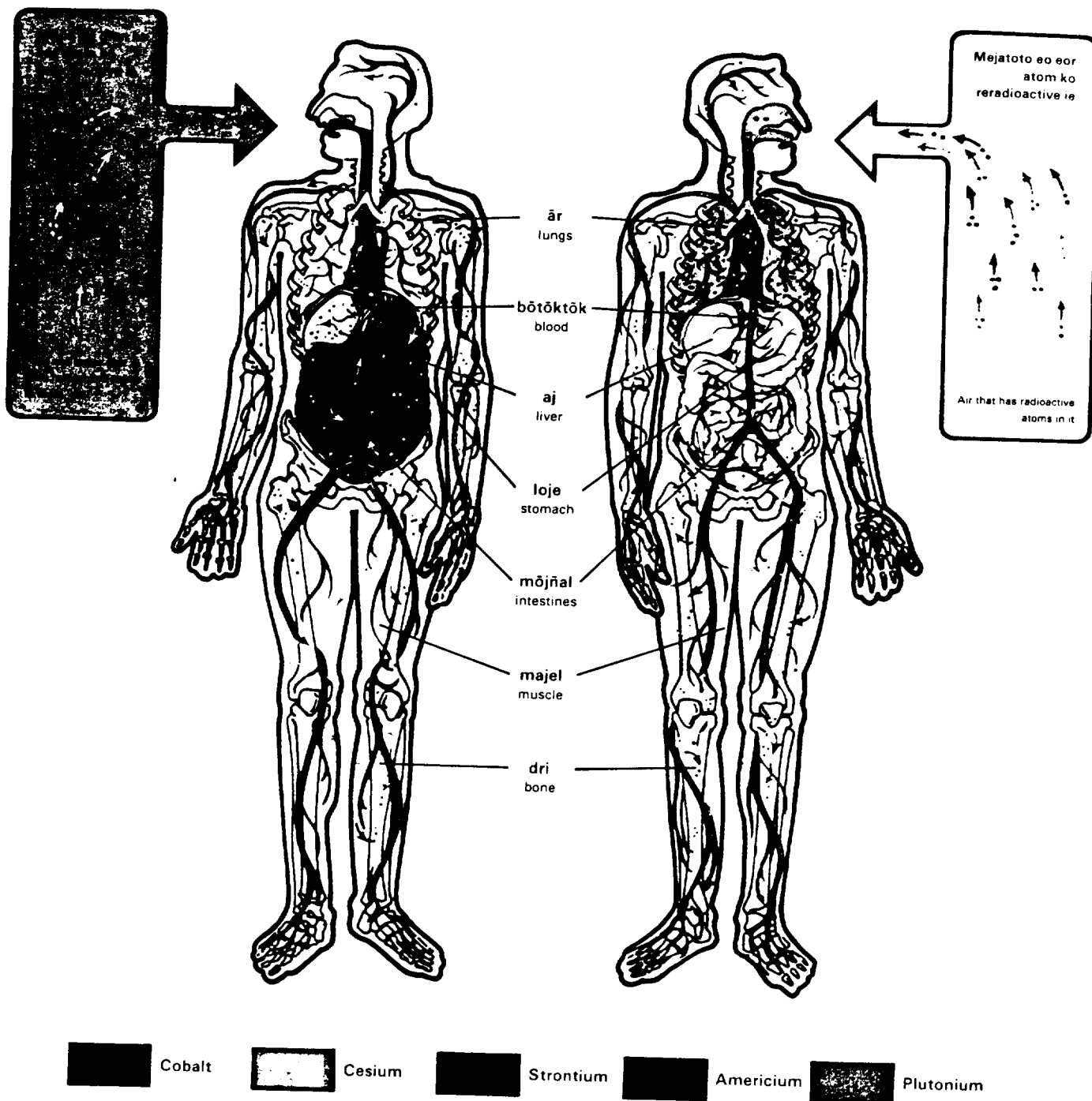
The cesium, cobalt, and potassium atoms that go from the intestines to the blood and other parts of the body in one day will leave the body little by little. Half of them will leave the body over several months. Half of what remains will also leave over another several months and this will continue. However, if people will again eat food with cesium or cobalt or potassium atoms in it, these new atoms will replace the atoms that have left their bodies. These new atoms will also leave the body little by little. All the parts of the body will receive radiation from these radioactive atoms when they are in the body.

Some of the strontium, uranium, and radium atoms that go from the intestines to the blood and then to the bones, will leave the body little by little when people eliminate, but many will remain in the bones for many years. If people will again eat food containing strontium or uranium or radium atoms, then these atoms will join the atoms that were already in the bones for many years, and radiation will continue to come from these radioactive atoms. The bones will receive radiation from these radioactive atoms.

Only a little americium and plutonium will go from the intestines to the blood and then to the bones and liver. Very few plutonium and americium atoms will leave the body during the years of a person's life. If people will again eat food containing americium or plutonium atoms, some of these atoms will join with the atoms that were already in the bones and liver. The bones and liver will receive radiation from these radioactive atoms, however, the amount will be very small.

When people breathe radioactive atoms in dust in the air, these atoms go to the lungs. Almost all of the dust and radioactive atoms will leave the lungs and the body, but some of the cobalt, cesium, strontium, and potassium atoms will go from the lungs to the blood. Much smaller amounts of americium, plutonium, uranium, and radium atoms will go from the lungs to the blood. Just like radioactive atoms that enter the body with food people eat, atoms of cesium, cobalt, and potassium enter the lungs with the dust people breathe and go from the lungs to the blood and to all parts of the body. Almost all of the strontium, americium, plutonium, and radium atoms and some of the uranium atoms that go from the lungs to the blood go to the bones, some of the americium and plutonium atoms will go to the liver. Part of the atoms of americium, plutonium, and uranium that enter the lungs will stay in the lungs for a very long time, and radiation will continue to come from these radioactive atoms. A smaller amount of radioactive atoms enters people's bodies in the air they breathe than the amount that enters in the food they eat.

(This information continues on page 23.)



Atom ko reradioactive ilo mōñā ko armij rej mōñā, renaj ilok nōn loje im nōn mōjñal. Jet ian atom kein rej ilok jen mōjñal nōn bōtōktōk. Atom ko rejjab ilok nōn bōtōktōk rej driojlok jen enbwin elikin juōn ak ruo ran. Atom ko reradioactive im rej ilok nōn bōtōktōk rej bareinwōt ilok nōn mōttan ko jet ilo enbwin.

Radioactive atoms in the food people eat will go to the stomach and to the intestines. Some of these atoms go from the intestines to the blood. The atoms that do not go to the blood leave the body after one or two days. The radioactive atoms that go to the blood also go to other parts of the body.

Atom ko reradioactive ilo buñalin mejatoto im armij rej emmenonoiki, rej ilok nōn ār. Jet ian atom kein rej ilok jen ār nōn bōtōktōk, im jen bōtōktōk nōn mōttan ko jet ilo enbwin. Jet ian atom ko im rejjab ilok nōn bōtōktōk rej driojlok jen enbwin elikin juōn ak ruo ran. Jet atom ko reradioactive rej bed wōt ilo ār iumin juōn ien eo eaetok.

Radioactive atoms in dust in the air people breathe go to the lungs. Some of these atoms go from the lungs to the blood, and from the blood to other parts of the body. Some of the atoms that do not go to the blood leave the body after one or two days. Some radioactive atoms stay in the lungs for a long time.

Joňan radiation juón armij ej bōke ilo aolep kajjojo mōttan ko ilo enbwinnin ej joňan wōt gamma radiation eo ej bōke jen atom ko reradioactive im rej bed jabrewōt jikin ibelakin enbwinnin, koba ibben radiation ko jen al im iju ko, koba ibben alpha im beta im gamma radiation ko jen atom ko reradioactive im rej bed ilo enbwinnin, einwōt cesium, strontium, potassium, im uranium.

Elap tokjen nonnonmej kinke ej kōmmōn cell in bōtōktōk. Joňan gamma radiation eo ej ilok ñōn nonnonmej jen atom ko reradioactive ibelakin enbwin, ej joňan wōt gamma radiation eo mōttan ko jet ilo enbwin rej bōke; bōtab ej bar kobatok alpha im beta im gamma radiation jen atom ko reradioactive im rej bed ilo dri. Kin men in, koban aolep radiation ko nonnonmej ej bōke emaroñ laplok jen joňan eo mōttan ko jet ilo enbwin rej bōke. Joňan radiation kein rej walok ilo millirem.

Erkein wāwen an armij bōk radiation ilo enbwinnier jen atom ko reradioactive im rar walok jen ien kōkōmmālmel atomic bomb ko, im ebareinwōt wāwen drein an armij bōk radiation jen atom ko reradioactive im rar baj bed wōt im mōttan lōl in, im rebed ijoko otemjej ilōl in.

The amount of radiation a person receives in all parts of his body is the amount of gamma radiation he receives from radioactive atoms that are anywhere outside his body along with radiations from the sun and stars as well as alpha and beta and gamma radiations from radioactive atoms that are inside his body such as cesium, strontium, potassium, and uranium.

Bone marrow is important because it makes blood cells. The amount of gamma radiation that goes to the bone marrow from radioactive atoms outside the body is the same as the amount of gamma radiation the other parts of the body receive; however, in addition to this there is alpha and beta and gamma radiation from radioactive atoms that are in the bone. Therefore, the total of all the radiations the bone marrow gets can be greater than the amount other parts of the body receive. These amounts of radiation are expressed in millirem.

These are the ways that people receive radiation in their bodies from radioactive atoms that came from the atomic bomb tests, and it is also the way people receive radiation from radioactive atoms that have always been in and part of the world and are everywhere in the world.

Chapter 4: Wāwen an Radiation Maroñ Kōmmōn Jorrān

Wāwen an Atom ko Reradioactive im Radiation ko Maroñ Jelet Enbwinnin Armij

Armij remaroñ watōk atom ko reradioactive bwe rej jet kain baijin. Bōtab atom ko reradioactive reinjuōn jen baijin kinke radiation ej walok jeni. An radiation jerbal im an baijin jerbal reinjuōn jen dron kinke enañin aolep ien ñe men ko rebaijin (einwōt jerajko, kerosene, drennin battery) rej dreloñ ilo enbwinnin juón armij emōkaj an walok jorrān ñōn enbwinnin—emaroñ iumin jet wōt minute ak ran. Ak elañe enaj wor jorrān jen joňan radiation eo ilo ailiñ ko ituiōñ ilo Majōl rainin, enaj to bwe en jino walok—emaroñ elikin elōñ yiō ko.

Kememej bwe eor radiation ear baj bed wōt im mōttan lōl in, im ebar wor radiation ej walok jen atomic bomb ko. Aolep radiation kein remaroñ kōmmōn jorrān.

Chapter 4: The Ways That Radiation Could Cause Harm

How Radioactive Atoms and Radiations Can Affect People's Bodies

People might consider that radioactive atoms are kinds of poison. However, radioactive atoms are different from poisons because radiation comes from them. The way radiation acts and the way poison acts are different because usually when poisonous things (like bleach, kerosene, battery fluid) enter a person's body, his body is quickly harmed—it can be within a few minutes or days. But if harm were to come from the amount of radiation in the atolls of the northern part of the Marshall Islands today, it would take a long time for it to begin to appear—it could be after many years.

Remember that there is radiation that has always been in and part of the world, and there is also radiation that comes from atomic bombs. All of these radiations can cause harm.

Emaroñ Wor Jorrān ej Walok ilo Enbwinnin Armij ro Emwij air Bōk Radiation

Elōñ mōttan ko rej kōmmōne juōn enbwin. Erkein jet iair: mej, kil, dri, aj, menono, ār, drekā in jibke, im bōtōktōk. Kajjojo mōttan ko ilo enbwin rej ejak jen bwijin men ko rekanuij in iddrik naetair cell ko. Elōñ kain cell ko, im ejjab aetokan wōt juōn air mour. Jet cell rej mour iumin jet ran, jet iumin alliñ, jet iumin yiō, innem mij. Jet kain cell remaroñ ajej im erom ruo cell kāl, im cell kein ruo rej bar erom emen cell, innem rualitōk cell, im eindrein air lōñlok. Wāwen drein an cell kein jerbal ñe juōn enbwin ej aikwij cell ko rekāl. Jet ian cell ko rekāl rej kōmmōn bwe juōn enbwin

en eddrek, im jet rej bōk jikin cell ko remij. Bareinwōt, ijoko rejorrān ilo enbwin rej bar mo ilo ejja wāwen in wōt, kin an cell ko rekāl bōk jikin cell ko rejorrān. Cell in bōtōktōk reinjuōn jen cell ko jet ilo enbwin kinke rej itoitak ilo aolepen enbwin. Juōn enbwin ej make kejbarok bwe cell ko rājmour ren jab eddrek im lōñlok jen joñan.

Ñe cell ko rej jorrān, ekkā wōt air mij im jab bar eddrek. Bōtab, jet ien juōn cell eo ejorrān emaroñ mour manlok wōt. Nañinmij in cancer ko remaroñ walok ñe juōn enbwin ejjab maroñ bōbrae an juōn cell eo ejorrān eddreklok, innem cell in ej mour wōt im emōkaj an eddrek im lōñlok im kileb jen joñan. Cell in cancer kein rej ejojik liñlok ion

Wāwen an cell ko ajej im lōñlok

*Juōn cell ej ajej im ruo cell kāl.
Cell kein ruo rej ajej im emen cell kāl.
Cell kein emen rej ajej im rualitōk cell kāl.*

An cell ko rājmour ajej im lōñlok

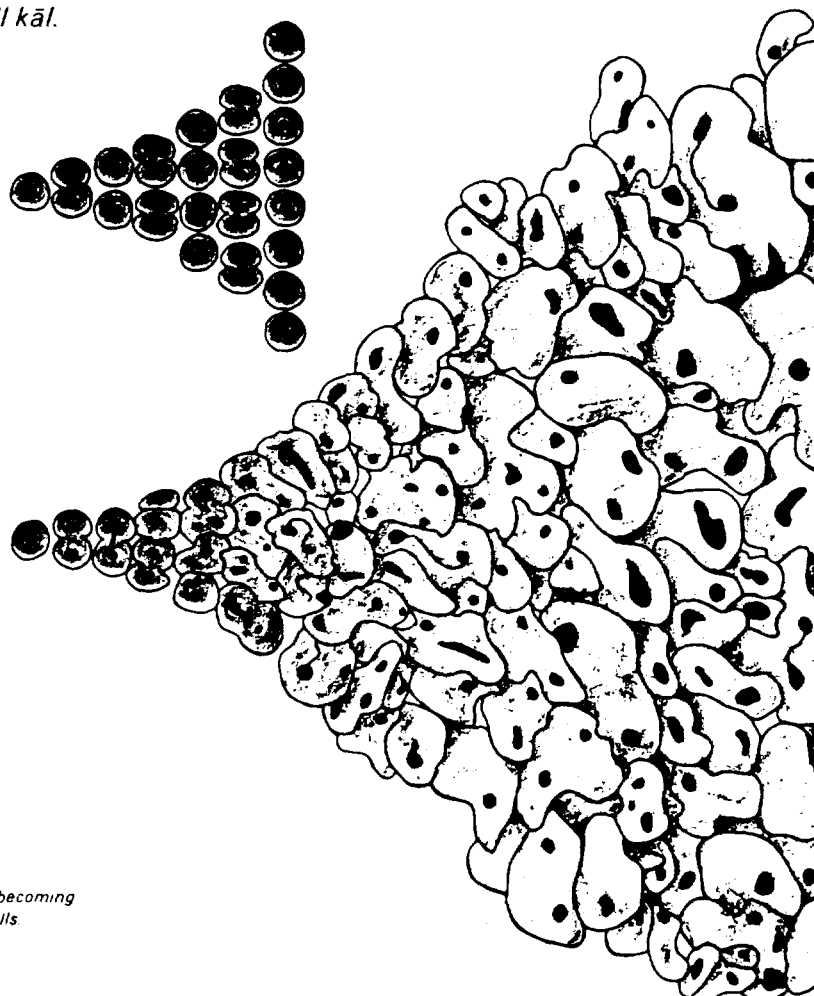
Healthy cells dividing and increasing

*Cell ko rājmour remaroñ oktak ñōn
cell in cancer.*

Healthy cells may change to cells of cancer.

How cells divide and increase

One cell divides becoming two new cells. These two divide becoming four new cells and these four divide becoming eight new cells



dron im rej kobajlok cell ko rājmour. Ilo an cell kein eindrein, remaroñ kokkure mōttan ko rājmour ilo enbwin im kōmmōn bwe armij ren nañinmij. Nañinmij in cancer ko remaroñ walok ilo jabrewōt jikin ilo enbwin im bareinwōt ilo bōtōktōk. Remaroñ walok einwōt lōpper ituloa ak itulik ilo enbwin. Cancer emaroñ eddrek im ajedred nōn aolepen enbwin.

Radiation emaroñ kōmmōn jorrān nōn cell ko, im cell ko rejjorrān remaroñ bwelen kōmmōn jorrān nōn enbwin. Ijellokin radiation, ebar wor men ko rej kōmmōn ejja jorrān rot in wōt nōn cell ko ilo enbwin, im eñin juōn iair: kōbaatat. Bareinwōt jet ien cell ko rej make jorrān. Elañe enaj eindrein an wor jorrān ilo cell ko, emaroñ walok nañinmij in cancer ko. Jet armij remaroñ mour jen nañinmij in cancer, ak jet remaroñ jab mour jene.

Nañinmij in cancer ko rar walok jabrewōt jikin ilōl in moktalok jen an wor atomic bomb. Nōn wanjoñok, ñe ear mij 100 armij ibelakin lōl in jen jabrewōt un ko, tarrin 15 iair rar mij jen cancer. Nañinmij in cancer ko rej walok wōt ibelakin lōl in nōn rainin. Kin men in eor ri Majōl im eor armij in ailiñ ko otemjej ilōl in renaj bōk nañinmij in cancer ko rejjab walok jen radiation.

Ibelakin lōl in, ejjelok oktak ikōtan cancer ko rej walok jen radiation im cancer ko rej walok jen men ko jet. Ñe eor nañinmij in cancer ko rej walok ibben ri Majōl ro emwij air bōk radiation ak ibben ro renaj bwelen bōk radiation tokelik, reban einjuōn jen ko rej walok ibben armij ro jet ilōl in. Ñe ej walok nañinmij in cancer ibben juōn armij, ejjelok en emaroñ jelā ear walok jen radiation ke ak jen men ko jet.

Emwij an scientist ro lo bwe juōn ian kain in atom ko reradioactive im ear walok jen ien eo rar kōkōmmālmel kin atomic bomb ko, emaroñ kōmmōn cancer ilo buru (ilo thyroid). Etan kain atom in "iodine." Jet wōt alliñ in an iodine rot in radioactive. Kin men in emwij an atom in iodine kein (jen ien kōkōmmālmel ko an United States) oktak nōn atom ko rejjab radioactive, innem ebwijrak an walok radiation jeni. Atom kein im rejjab radioactive reban kōmmōn cancer ilo buru.

Scientist ro rejelā bwe ekkā an naj maroñ walok jorrān (cancer) ibben juōn armij eo elap an bōk radiation jen eo edrik an bōk radiation.

It Is Possible for Harm to Happen in the Bodies of People Who Have Received Radiation

The body contains a number of parts. Some of these are eyes, skin, bones, liver, heart, lungs, kidneys, and blood. Each of the parts of the body is made of many very tiny things called cells. There are many kinds of cells, and not all of them live the same length of time. Some cells live a few days, some for months, some for years and then die. Some kinds of cells are able to divide and become two new cells, and these two cells become four cells, and then eight cells, and in this way, they increase in number. This is the way these cells function when the body needs new cells. Some of the new cells cause the body to grow, and some replace cells that have died. Also, wounded places in the body heal in this same manner by new cells replacing damaged cells. Blood cells are different from other cells in the body because they travel throughout the body. The body itself watches over healthy cells so that they do not grow and increase more than they should.

When cells are damaged, they almost always die and do not grow any more. However, sometimes a damaged cell may continue to live. Diseases of cancer might happen when a body is not able to stop a damaged cell from growing, and then this cell continues to live and grows fast and increases in number and size more than it should. These cancer cells pile up on top of each other and crowd out healthy cells. As these cells do this they are able to damage the healthy parts of the body and can make people sick. Diseases of cancer can occur any place in the body and also in the blood. They can occur like a swelling inside or outside on the body. Cancer can grow and spread throughout the whole body.

Radiation can damage cells and damaged cells might harm the body. In addition to radiation, there are other things that cause the same kind of damage to cells in the body, and one of them is smoking. Sometimes cells are damaged just by themselves. If this kind of damage occurs in cells, diseases of cancer can occur. Some people can recover from cancer, but others may not recover from it.

Cancers occurred all over the world before there were atomic bombs. For example, if 100 people died around the world from all causes, around 15 of them died from cancer. The diseases of cancer continue to occur around the world. Therefore, there are people of the Marshall Islands and people of all countries around the world who will get diseases of cancer that are not produced by radiation.

Around the world, there is no difference between cancers that are caused by radiation and cancers that are caused by other things. If the diseases of cancer appear among the people of the Marshall Islands who have received radiation or who may receive radiation in the future, they would be no different from those that appear in other people around the world. When cancer occurs in a person, no one is able to know if the cancer came from radiation or from other things.

Scientists have found that one of the kinds of radioactive atoms that came from the atomic bomb tests can cause cancer in the throat (in the thyroid). The name of this kind of atom is "iodine." This kind of iodine is radioactive only a few months. Therefore, these iodine atoms (from the U.S. bomb tests) have changed to atoms that are not radioactive, and radiation has stopped coming from them. These atoms that are not radioactive cannot cause cancer in the throat.

Scientists know that it is more likely that harm (cancer) will occur to a person who receives a large amount of radiation than to one who receives a small amount of radiation.

Elikin an Armij Bōk Radiation, Emaroñ Wor Jorrān ñōn Ajiri ro Nejier Renaj Lotak Tokelik

Ibelakin lōl in, emaroñ wor 10% in oran ajiri ro rej lotaktok kin nañinmij im utamwe ko rar bōk jen jineir ak jemeir. Erkein jet iair: jarroñroñ, bilo, jibikbik in enbwin, bwebwe ak utamwe in kōmālij. Bareinwōt emaroñ wor jibuñ im mij loje. Aolep utamwe rot kein rar walok ijoko otemjej ilōl in moktalok jen an kar wor kōkōmmālmel kin atomic bomb, im rej walok wōt ñōn rainin. Jen an scientist ro katak kin kijdrik, rej tōmak bwe utamwe rot kein remaroñ bareinwōt walok elañe radiation ej kōmmōn jorrān ñōn inen juōn kōrā ak juōn emman. Bōtab rej jañin lo an lōñlok utamwe rot kein ibben armij ro ilo jukjukin bed ko ijoko jet ilōl in im elaplok air kar bōk radiation jen joñan eo armij ro ilo Majōl rej bōke.

Scientist ro rej tōmak bwe ekkā an naj maroñ wor utamwe ibben ajiri ro nejin juōn armij eo elap an bōk radiation, jen eo edrik an bōk radiation.

After People Receive Radiation, There Can Be Harm to Their Children Born Later

Around the world, about 10% of all children are born with diseases and infirmities that they got from their mothers or fathers. Some of these are: deafness, blindness, physical malformations or mental retardation. Miscarriages and stillbirths also occur. All of these kinds of defects occurred everywhere in the world before the atomic bomb tests and they continue to occur today. From the scientists' study of rodents, they believe that these kinds of defects can also occur if radiation causes harm to the seeds of a woman or a man. However, they have not seen an increase in these kinds of defects among the people of communities in other places of the world that have received a greater amount of radiation than the amount the people in the Marshall Islands receive.

Scientists believe that it is more likely that there will be defects in the children of a person who receives a large amount of radiation than in the children of one who receives a small amount of radiation.

Eor jet kain nañinmij ak utamwe ko remaroñ walok ibben jabrewōt niñniñ, ko ear bōk jen jinen ak jemen.

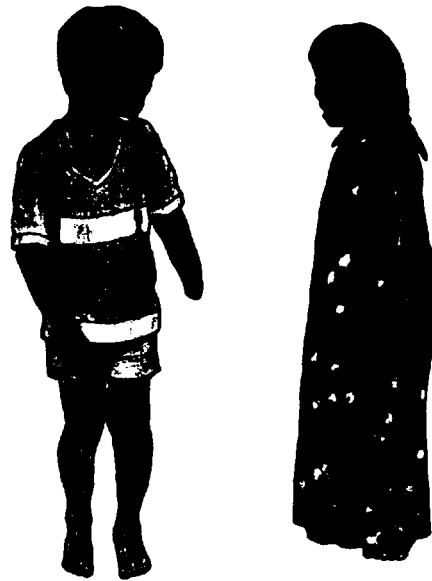
There are some kinds of sicknesses or infirmities that can occur in any baby which it got from its mother or father.





Jet niñniñ rej mij mokta jen air lotak, im jet rej lotaktok kin utamwe.

Some babies die before they are born, and some are born with defects.



Erkein jet ian utamwe ko: jibikbik, im utamwe in kōmālij.

These are some defects: malformations and mental defects.

Menin Mour im Menin Eddrek Remaroñ ke Bōk Jorrān Jen Radiation?

Jet ien radiation emaroñ kōmmōn jorrān ñōn menin mour ko, einwōt an kōmmōn ñōn armij. Bōtab eaikwij in kanuij in laplok joñan radiation eo ej jelet keinikkan ko im menin eddrek ko jen menin mour ko bwe en kab maroñ wor jorrān ñōn keinikkan ko, einwōt mā, ni, bōb, iarej, im makmōk. Melelen, bwe menin eddrek ko raab jorrān wōt ñe elukkun lap an lap joñan radiation rej boke. Kin an drik joñan radiation eo ilo Majōl rainin, scientist ro rejjab tōmak bwe enaj wor jorrān ñōn menin mour im menin eddrek ko.

Can Animals and Plants Receive Harm from Radiation?

Sometimes radiation can cause harm to animals like it can to people. However, the amount of radiation must be very much larger to food-bearing plants and other plants than to animals for there to be harm to plants such as breadfruit, coconuts, pandanus, taro, and arrowroot. This means that plants would only be harmed if they received an exceedingly large amount of radiation. Because the amounts of radiation are small in the Marshalls today, scientists do not believe that there will be harm to animals and plants.

Chapter 5: Wāwen Joñe Joñan Radiation

Wāwen an Scientist ro Joñe Joñan Radiation Juōn Armij ej Bōke

Eor atom ko reradioactive ilo enbwinnin aolep armij ilōl in. Armij reban make jelā joñan radiation ilo enbwinnier kab ilo jabrewōt men, kinke rejjab maroñ in loe, roñjake, nemake, āt bwin, ak eñjake. Kein kakōlkōl ko wōt remaroñ kalikkare. Elōñ kein kakōlkōl ko ñōn joñe joñan radiation eo ej walok jen atom ko reradioactive ilo bwirej, ilo mōñā, ilo mejatoto, im ilo dren. Scientist ro rej kejerbal kein kakōlkōl kein ñōn air bōk melele ko bwe ren maroñ in antonelok joñan radiation armij remaroñ bwelen bōke.

Ebareinwōt wor juōn kein kakōlkōl scientist ro rej kejerbale ñōn joñe joñan gamma radiation eo ej walok jen atom ko reradioactive ilo enbwin. Scientist ro rar bōktok kein kakōlkōl in ñōn ailiñ ko ilo Majōl im elaplok joñan atom ko reradioactive ie, im rar joñe joñan gamma radiation eo ej walok jen atom ko reradioactive ilo enbwinnin armij ro. Scientist ro rej wōnmanlok wōt ilo air kōmmōne jerbal in.

Scientist ro rej kejerbal kein kakōlkōl in ñōn air joñe joñan gamma radiation eo ej walok jen potassium, cesium, im cobalt ilo enbwinnin juōn armij, bōtab kein kakōlkōl in ejjab maroñ in joñe joñan radiation ko rej walok jen plutonium, americium, im strontium. Wāwen air joñe men kein jilu, rej bōk drennin kebbojak im joñe joñan kajjojo kain atom kein reradioactive ie. Jen air kōmmōne men in remaroñ antonelok joñan plutonium, americium, im strontium ilo enbwinnin juōn armij.



Kein kakōlkōl eo rej kejerbale ñōn joñe joñan gamma radiation eo ej walok jen potassium ak cesium ak cobalt ilo enbwinnin juōn armij

The instrument used to measure the amount of gamma radiation from potassium or cesium or cobalt in a person's body

Chapter 5: How Radiation Is Measured

The Ways That Scientists Measure the Amount of Radiation a Person Receives

Everybody in the world has some radioactive atoms in his body. People cannot know by themselves how much radiation is in their bodies or in anything else because they cannot see it, hear it, taste it, smell it, or feel it. Only instruments can reveal this. There are instruments for measuring the amount of radiation that comes from radioactive atoms that are in soil, in food, in air, and in water. Scientists use these instruments to get information to estimate the amount of radiation that people might receive.

There is also an instrument that scientists use to measure the amount of gamma radiation that comes from radioactive atoms in the body. Scientists brought this instrument to the atolls in the Marshalls that have a larger amount of radioactive atoms there, and they measured the amount of gamma radiation that comes from radioactive atoms in the bodies of the people. Scientists are continuing this activity.

Scientists use this instrument to measure the amount of gamma radiation from potassium, cesium, and cobalt in a person's body, but this instrument is not able to measure the radiations from plutonium, americium, and strontium. The way they measure these three things, they take urine and measure the amount of each of these kinds of radioactive atoms in it. From doing this they are able to estimate how much plutonium, americium, and strontium is in a person's body.

Joñan Radiation eo Emwij Karōke (Radiation Standard ko)

Ejjelok en elukkun jelā joñan radiation juōn armij emaroñ bōke im jab wor jorrān ñōn enbwinnin. Scientist ro rej tōmak bwe meñe edrik joñan radiation eo ak emaroñ bwelen wor jorrān ñōn enbwin. Ibelakin lōl in, elōñ drolul in scientist im taktō rej etale im ekkatak kin men in. Erkein etan jet ian drolul ko:

International Commission on Radiological Protection
United Nations Scientific Committee on Effects of Atomic Radiation
International Atomic Energy Agency
U.S. Environmental Protection Agency
U.S. National Council on Radiation Protection and Measurements.

Ñōn kejbarok armij jen jorrān ko remaroñ walok jen radiation, ekkar ñōn tōbran melele ko emwij air loi, emen ian drolul kein rej kwalok jet joñan radiation ko armij ren jab bōk elaplok jeni. Rej naetan joñok kein "radiation standard," im bwimbwin ko rej kejerbali "millirem." Drolul kein rej bareinwōt rejañ armij bwe ren kajjeoñ kejbarok bwe en drik joñan radiation eo ej dreloñ ñōn enbwinnier, joñan wōt air maroñ. Kien eo an United States im bar elōñ kien ko jet rej rejtak im lori karōk kein.

Kin men in, emwij an Kien eo an United States karōk bwe juōn ri America en jab bōk radiation elaplok jen 500 millirem ilo juōn yiō, ijellokin radiation ko taktō rej kejerbali im ko rar baj mōttan wōt lōl in. Bareinwōt rar karōk bwe joñan radiation eo iolap (average) armij ro rej jokwe ilo United States remaroñ bōke iumin 30 yiō en jab laplok jen 5,000 millirem. Joñok kein rej ja einwōt joñok ko drolul ko imanlok rar kwaloki. Kien eo an United States ej bareinwōt kajjeoñ kejbarok joñan wōt an maroñ, bwe joñan radiation eo ri ailiñ eo an rej bōke en driklok jen joñan bwimbwin kein. Elañe juōn armij enaj le jidrik jen joñan kein, enaj kanuij jeja bwe en wor jorrān ñōne.

Ilo an naj kajjojo armij lali melele kein retōbrak ilo page 34-61, elap tokjen bwe ren melele bwe ejjab joñan wōt juōn an kajjojo armij bōk radiation. Unin, kinke ejjab joñan wōt juōn an armij mōñā mōñā ko elōñ atom ko reradioactive ie, bareinwōt ejjab juōn wōt jikin air jokwe, im ejjab einwōt juōn air makitkit ilo ailiñ in Majōl im ilo lōl ko jet.

The Amounts of Radiation That Have Been Established [a limit is implied] (Radiation Standards)

No one is absolutely certain how much radiation a person can receive and not have harm to his body. Scientists believe that even if the amount of radiation is small, it is perhaps possible that there could be harm to the body. Around the world, many groups of scientists and doctors are studying this subject. The names of some of these organizations are:

International Commission on Radiological Protection
United Nations Scientific Committee on Effects of Atomic Radiation
International Atomic Energy Agency
U.S. Environmental Protection Agency
U.S. National Council on Radiation Protection and Measurements.

To protect people from the harms that might come from radiation, based upon the information they have found, four of these organizations have recommended some amounts of radiation that people should not exceed. They call these amounts "radiation standards," and the numbers they use are [in] "millirem." These organizations also recommend that people try to take care that the amount of radiation that enters their bodies should be as small as possible. The U.S. government and many other governments approve and follow these recommendations.

Therefore, the U.S. government has established that an American should not receive more than 500 millirem of radiation in one year, in addition to radiation that doctors use and that which has always been a part of the world. Also they established that the average amount of radiation that people who live in the United States may receive over a 30-year period should not be more than 5,000 millirem. These amounts are just the same as the amounts that the above-mentioned organizations have recommended. The U.S. government also tries to ensure as much as possible that the amount of radiation its citizens receive is lower than these figures. If a person exceeds these amounts by a little, it will be very unusual that any harm would happen to him.

As each person looks at the information that has been achieved given on pages 34 to 61, it is very important to understand that each person does not receive the same amount of radiation. The reason is because the amount of radioactive food people eat is not the same, also the places they live are not the same, and their movement throughout the Marshall Islands and other countries is not the same.

**Wāwen an Scientist ro Maroñ Antonelok Joñan
Radiation Juōn Armij Emaroñ Bwelen Bōke
Elañe Enaj Jokwe ilo Ailiñ ko ituiōñ ilo Majōl**

Jen tokjen katak ko im joñok ko relōñ scientist ro ilo Lawrence Livermore National Laboratory rar kōmmōni, emwij air antone joñan radiation eo armij remaroñ bwelen bōke elañe renaj jokwe ilo ailiñ ko ituiōñ ilo Majōl.

Scientist ro rar kōb elōñ roñ, jet rebijbij im jet remwilōl, im bōk mōttan bwirej jeni im joñe joñan atom ko reradioactive ilo mōttan bwirej kein kajjojo. Rar bar etale drennin lojet, jen lometo im jen lomalo, im bareinwōt drennin aebōjlōl ko. Scientist ro rar antone kain mōñā rot ko ri Majōl rej mōñā im joñan air mōñā mōñā kein. Rar ebbōk pig im bao im ek im menin mour ko jet jen lojet, bareinwōt bao in mejatoto im ekkatak kaki. Rar etale joñan an keinikkan ko im menin eddrek ko jet bōk atom ko reradioactive jen bwirej. Rar bareinwōt etale joñan atom ko reradioactive ilo buñal imejatoto. Rar kālok ion elōñ ailiñ ko ituiōñ ilo Majōl kin kein kakōlkōl ko im joñe joñan gamma radiation eo ej itok jen bwirej.

Erkein melele ko emwij an scientist ro loi, ekkar ñōn jerbal kein rar kōmmōni:

1. joñan atom ko reradioactive ilo kajjojo ene ko rar etali
2. atom rot kein reradioactive ilo kajjojo ene kein
3. tu ia ilo bwirej atom kein reradioactive rebed ie
4. joñan radiation eo ej walok jen bwirej
5. joñan atom ko reradioactive ilo bwirej im renaj dreloñ ilo mōñā ko, menin eddrek ko, im menin mour ko

6. joñan atom ko reradioactive ilomalo im ilometo, im bareinwōt ilo mōñā ko jen lojet, einwōt ek, baru, wor, im kaboor

7. joñan atom ko reradioactive ilo aebōjlōl ko im drennin idrak ko

8. joñan atom ko reradioactive ilo buñal imejatoto im armij rej emmenonoiki.

Ilo yiō ko remotlok, emwij kejerbal jet million dollar ko im elōñlok jen buki armij ro ñōn air kōtōbraki melele kein.

Jen aolepen melele kein wōj, scientist ro remaroñ antonelok joñan radiation juōn armij emaroñ bōke jen men ko kijen, jen mejatoto eo ej emmenonoiki, im jen bwirejin eneo ej jokwe ie.

Bōtab eban joñan wōt juōn radiation ibben kajjojo armij ro ilo ailiñ ko ituiōñ ilo Majōl, kinke ejjab joñan wōt juōn joñan atom ko reradioactive ilo bwirej jen jikin ñōn jikin. Bareinwōt ejamin joñan wōt juōn im juōn wōt kain mōñā ko kijeir, im ejamin joñan wōt juōn buñal ilo mejatoto eo rej emmenonoiki, innem eban joñan wōt juōn joñan atom ko reradioactive ilo enbwinnier. Enaj driklok an jet armij bōk radiation jen bar jet.

**The Ways That Scientists Are Able to Estimate the Amount of
Radiation a Person Might Receive If He Lives in the Northern Part
of the Marshall Islands**

As a result of the many studies and measurements the scientists at Lawrence Livermore National Laboratory have made, they have estimated the amount of radiation that people might receive if they live on atolls in the northern part of the Marshall Islands.

Scientists dug many holes, some shallow and some deep, and took portions of soil from them and measured the amount of radioactive atoms in each of these portions of soil. They also examined salt water from the ocean and the lagoons and water from wells. Scientists estimated the kinds of foods Marshallese people eat and the amounts of foods they eat. They took pigs and chickens, fish and other sea life and also birds and studied them. They examined the amount of radioactive atoms that food-bearing trees and other plants have taken from the soil. They also examined the amount of radioactive atoms in the dust in the air. They flew over many atolls in the northern part of the Marshall Islands with instruments and measured the amount of gamma radiation that comes from the soil.



This is the information that the scientists have found as a result of the work they did:

1. the amount of radioactive atoms on each of the islands they examined
2. the kinds of radioactive atoms on each of these islands
3. where in the soil these radioactive atoms are
4. the amount of radiation that comes from the soil
5. the amount of radioactive atoms in the soil that will enter foods, plants, and animals
6. the amount of radioactive atoms in the lagoons and the ocean and also in food from them, such as fish, crabs, lobsters, and clams
7. the amount of radioactive atoms in wells and drinking water
8. the amount of radioactive atoms in the dust in the air that people breathe.

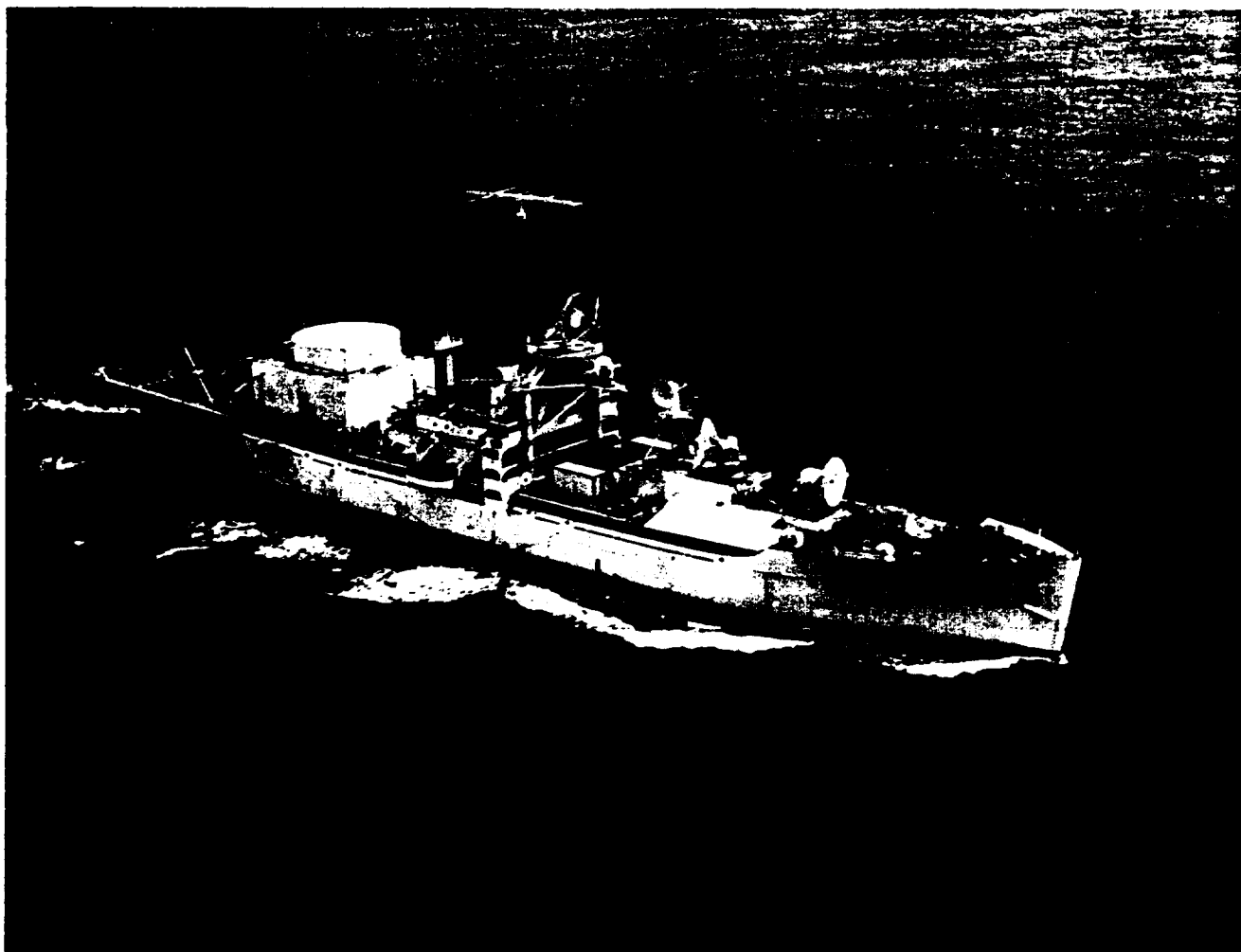
Over the past years, millions of dollars have been used and over 100 people [have worked] to arrive at this information.

From all of these data, the scientists are able to estimate the amount of radiation a person can receive from the things he eats, from the air he breathes, and from the soil of the island he lives on.

However, the amount of radiation for each person in the northern part of the Marshall Islands will not be the same because there is not the same amount of radioactive atoms in the soils from place to place. Also, the amount and kinds of foods people eat will not be the same, and the amount of dust in the air they breathe will not be the same, so the amount of radioactive atoms in people's bodies will be different. Some people will receive less radiation than others.

*Scientist ro rar kejerbal wan ekkāke ko ñōn air
kālōk kin kein kakōlkōl ko ion ene ko im joñe
joñan gamma radiation eo ej itok jen bwirej.*

Scientists used aircraft to fly with instruments over islands to measure the amounts of gamma radiation that come from the soil.



*Scientist ro rar kejbale wan Navy in, etan
U.S.S. Wheeling, ilo ien eo rar etali ailiñ ko ituiñ
ilo Majōl ilo 1978.*

*Scientists used this Navy ship, named U.S.S. Wheeling, during the time they
surveyed the atolls in the northern part of the Marshall Islands in 1978.*

Chapter 6: Melele ko Retōbrak jen Joñok Lōñlōñ ko

Jen joñok ko emwij kemeleleiki imanlok ilo book in, emwij an scientist ro ilo Lawrence Livermore National Laboratory antone joñan radiation eo armij remaroñ bwelen bōke ilo air jokwe ilo ailiñ ko emwij kemelele kaki ilo book in. Melele kein rej lajrak ilo page 34 ñōn 61. Melele kein ilo page kein rej kwalok joñan radiation eo armij ro remaroñ bwelen bōke elañe renaj bed wōt ilo kajjojo ailiñ kein ituiōñ. Kememej bwe joñan radiation armij rej bōke jen mōñā ko rej kañi, elaplok jen joñan eo rej bōke jen men ko jet.

Jen wōt an scientist ro kejerbali melele kein iman, remaroñ antone oran armij ro remaroñ bwelen bōk jorrān jen radiation eo ej walok jen atom ko reradioactive im rej bed wōt ilo ailiñ ko ituiōñ ilo Majōl jen ien kōkōmmālmel kin atomic bomb ko. Ilo 1972 kab 1980, juōn drolul in scientist ilo United States, etan in The National Academy of Sciences—National Research Council's Committee on the Biological Effects of Ionizing Radiation, ear antonelok oran armij ro remaroñ mij jen cancer kab oran niñniñ ro remaroñ lotaktok kin utamwe in enbwini ak utamwe in kōmālij walok jen radiation. Oran armij ro ilo ailiñ ko ituiōñ ilo Majōl im remaroñ mij jen cancer ko walok jen radiation, im oran niñniñ ro remaroñ lotaktok kin utamwe in enbwini, walok jen radiation, rej ellajrak ilo page 35 ñōn 61. Bwinbwin kein rej ekkejil wōt ibben melele ko an scientist ro ilo drolul in iliñ, im bareinwōt ekkar ñōn ien bwinbwin armij eo ilo 1980, eo Kien eo an Trust Territory ear kōmmōne im lelok ñōn United Nations. Kab bwinbwin kein rej lor wōt kōtmene eo an scientist ro bwe emaroñ jilu alen an lōñlok oran armij in Majōl elikin 30 yiō jen kiō.

Ilo aolep bwinbwin ko ikijjen joñan radiation emwij kellajraki ilo page 35 ñōn 61, ejjab kobatok tarrin 50 millirem in radiation eo jen atom ko reradioactive im rej mōttan wōt lōl in kab radiation eo ej itok jen al im iju ko ilo yiō otemjej. Elañe juōn armij ilo Majōl ekōnan jelā ewi joñan aolepen radiation ko ej bōki jen bwirej im lojet im men ko ilōñ ilo juōn yiō, ej aikwij in kobaik tarrin 50 millirem na ibben bwinbwin ko kin joñan radiation ilo ailiñ eo ej bed ie (lale page 35 lok ñōn 61). Jemaroñ keidi bwinbwin kein na ibben joñan radiation armij ro ilo United States rej bōke

jen atom ko reradioactive im rej mōttan wōt lōl in kab radiation eo ej itok jen al im iju ko im jen ien kōkōmmālmel atomic bomb ko, eo ej tarrin 50 millirem lok ñōn 250 millirem ilo juōn yiō. Joñan radiation juōn armij ej bōke iumin 30 yiō ilo United States ej tarrin 1,500 millirem lok ñōn 7,500 millirem. Eor jet jikin ko reiet ion lōl in im joñan radiation armij ro rej jokwe ie rej bōke emaroñ tōbar 2,000 millirem juōn armij juōn yiō, ak 60,000 millirem juōn armij iumin 30 yiō. Aolep radiation kein remaroñ kōmmōn bwe armij ren bōk nañinmij in cancer ak lotaktok kin utamwe.

Aolep bwinbwin ko ilo page 35 ñōn 61 rej atartar wōt ilo melele ko rejimwetata ibben scientist ro ilo ien in. Bōtab ej wor wōt katak ko rej wōnmanlok wōt ikijjen men kein.

Chapter 6: The Information Obtained from the Many Measurements

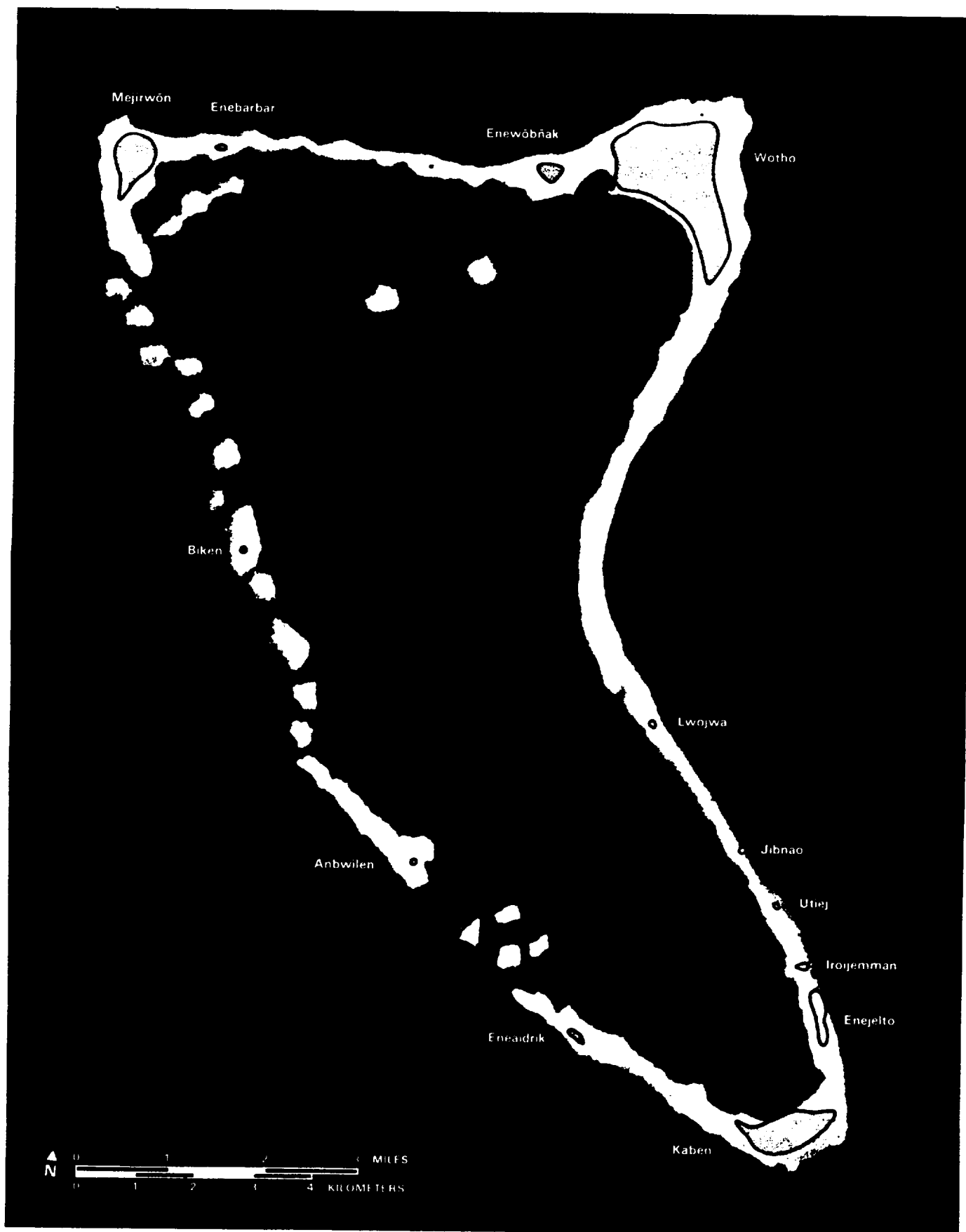
From the measurements that have been explained earlier in this book, scientists at Lawrence Livermore National Laboratory have estimated the amount of radiation the Marshallese people might receive by living on the atolls discussed in this book. This information is listed on pages 34 through 61. The information on these pages shows the amount of radiation people might receive if they always live on these northern atolls. Remember that the amount of radiation people receive from the food they eat is greater than the amount they receive from other things.

By using the above information, scientists are able to estimate the number of people who might receive harm from the radiation that comes from radioactive atoms that are still on the atolls of the northern part of the Marshall Islands from the time of atomic bomb tests. In 1972 and 1980, a scientific organization in the United States named The National Academy of Sciences—National Research Council's Committee on the Biological Effects of Ionizing Radiation estimated the number of people who might die from cancer and the number of infants who might be born physically or mentally defective as a result of radiation. The number of people on the atolls in the northern part of the Marshall Islands who might die from cancers caused by radiation, and the number of infants who might be born with health defects caused by radiation are listed on pages 35 to 61. These numbers depend upon the information of the scientists in the organization named above [The National Academy of Sciences—National Research Council's Committee on the Biological Effects of Ionizing Radiation] and also are based on the census of 1980 that the Trust Territory government took for the United Nations. Also these numbers are based on the scientists' assumption that the population of the Marshall Islands may triple in the next 30 years.

In all of the numbers regarding amounts of radiation listed on pages 35 to 61, about 50 millirem per year of radiation from radioactive atoms that are just part of the world and radiation from the sun and stars are not included. If a person in the Marshalls wishes to know the total amount of radiation he receives from the soil and ocean and heavenly bodies in a year, he must add about 50 millirem to the amounts of radiation given for the atoll where he is (see pages 35 to 61). We can compare these figures to the amount of radiation the people in the United States receive from radioactive atoms that are just part of the world and radiation from the sun and stars, and from atomic bomb tests, which is about 50 to 250 millirem each year. The amount of radiation a person receives during 30 years in the United States is about 1,500 to 7,500 millirem. There are a few places in the world where the amount of radiation the people who live there receive can reach 2,000 millirem per person per year, or 60,000 millirem per person during 30 years. All of these radiations might cause people to get cancer or be born with defects.

All the numbers on pages 35 to 61 depend upon the most accurate information the scientists have at the present time. However, further studies are being done on these matters.

Ailiñ in Wotho



Melele ko Retōbrak jen Joñok ko ilo 1978

Elañe 76 armij rej jokwe ionenen Wothon im mōñā mōñā in ailiñ kein ko wōt jen ionene:

Scientist ro rej antone bwe joñan radiation eo elaptata im juōn armij emaroñ bwelen bōke iumin juōn yiō jen atom ko reradioactive im rar walok jen ien kōkōmmālmel eo an United States ej 30 millirem. Ak joñan radiation eo elaptata ekkā an juōn armij maroñ bwelen bōke enaj drik jen joñan in. Joñan radiation in ej driklok yiō otemjej, bōtab ekanuij in rumwij an driklok.

Joñan radiation eo iolap (average) eo elaptata im juōn armij emaroñ bwelen bōke ilo yiō kein 30 rej itok ej 200 millirem ilo jabrewōt mōttan ko ilo enbwin, im 230 millirem ilo wōt nonnonmej.

Ilo yiō kein 30 rej itok, scientist ro rej antone bwe emaroñ wor 3 armij remaroñ mij jen nañinmij in cancer ko rej walok jen un ko jet ijellokin radiation eo ej itok jen ien kōkōmmālmel kin atomic bomb ko. Innem emaroñ bar kobatok 0.002 ñōn 0.01 oran ro remaroñ mij ilo yiō kane rej itok, jen cancer ko rej walok jen radiation eo rej bōke ilo yiō kein 30 rej itok, jen ien kōkōmmālmel kin atomic bomb ko.

Ilo yiō kein 30 rej itok, scientist ro rej antone bwe emaroñ wor 20 ajiri rej lotaktok kin nañinmij ak utamwe walok jen un ko jet ijellokin radiation eo ej itok jen ien kōkōmmālmel kin atomic bomb ko. Innem emaroñ kobatok 0.0002 ñōn 0.003 oran ajiri ro renaj bwelen lotaktok tokelik kin utamwe, walok jen radiation eo jineir ak jemeir rej bōke ilo yiō kein 30 rej itok, jen ien kōkōmmālmel kin atomic bomb ko.

Elañe armij renaj jokwe ion Mejirwōn im Kaben im mōñā mōñā ko ie im jab mōñā jen ionenen Wothon, ejamin kanuij einjuōn joñan radiation eo renaj bōke.

Information That Has Been Obtained from the Measurements Made in 1978

If 76 people live on Wothon Island and eat local food only from Wothon Island

Scientists estimate that the largest amount of radiation a person might receive in one year from radioactive atoms that came from the U.S. bomb tests is 30 millirem. But usually the largest amount a person might receive would be less than this. This amount of radiation decreases every year, however, it decreases very slowly.

The highest average amount of radiation people might receive in the coming 30 years is 200 millirem in any part of the body and 230 millirem in just the bone marrow.

In the coming 30 years, scientists estimate that 3 people may die from cancers caused by things other than radiation from the atomic bomb tests. In addition to this, from 0.002 to 0.01 people may die in the future from cancers caused by radiation received in the coming 30 years from the atomic bomb tests.

In the coming 30 years, scientists estimate that 20 children could be born with health defects caused by things other than radiation from the atomic bomb tests. In addition to this, 0.0002 to 0.003 children may eventually be born with health defects caused by radiation their parents receive in the coming 30 years from the atomic bomb tests.

If people live on Mejirwōn and Kaben and eat food from there and not food from Wothon Island, the amount of radiation they receive would not be much different.



Edriktata joñan atom ko re-radioactive ie

The least amount of radioactive atoms



Edrik joñan atom ko re-radioactive ie

A small amount of radioactive atoms



Elaplok joñan atom ko re-radioactive ie

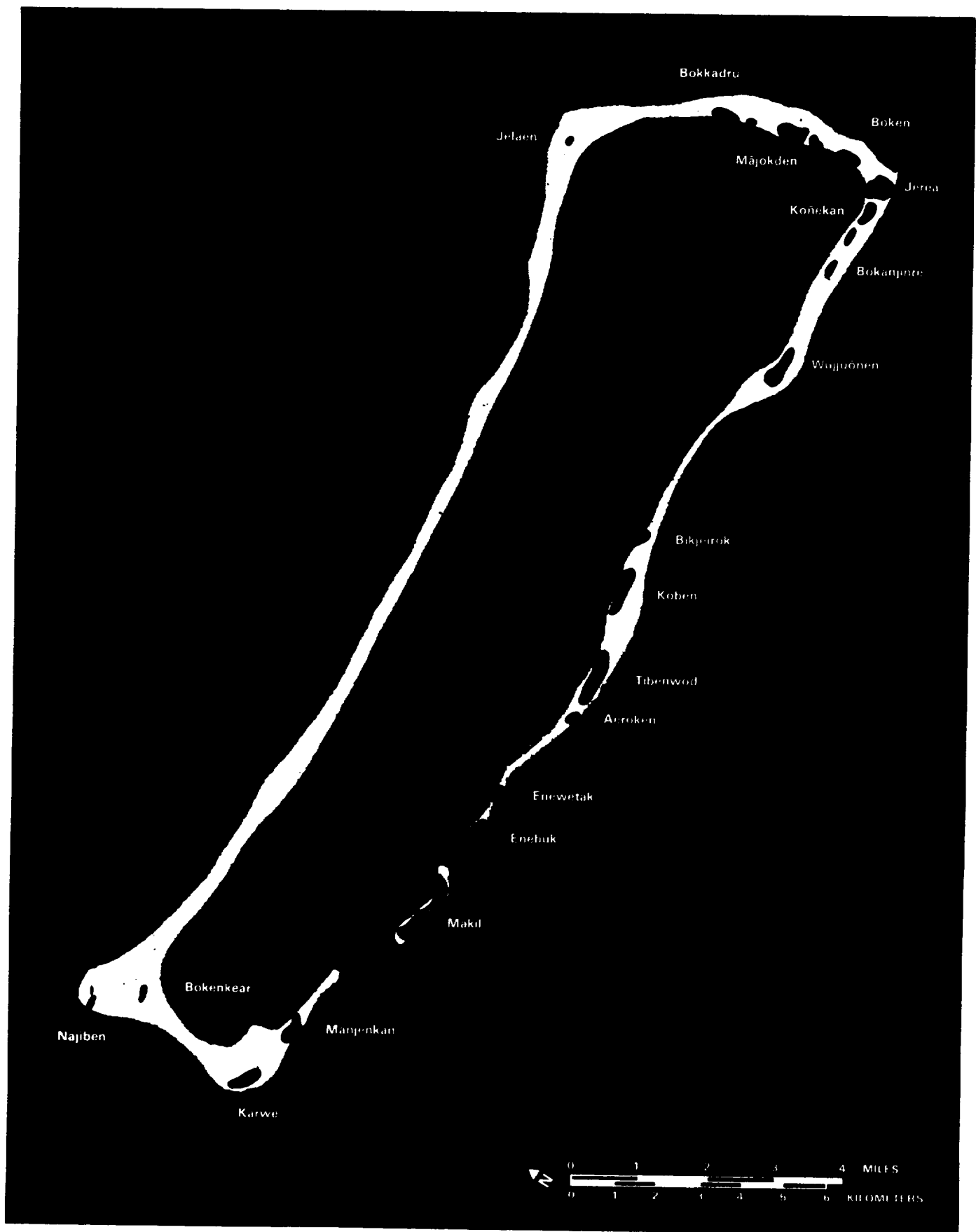
A larger amount of radioactive atoms



Elaptata joñan atom ko re-radioactive ie

The largest amount of radioactive atoms

Aíliñ in Ailinginae



Melele ko Retōbrak jen Joñok ko ilo 1978

Elañe 100 armij renaj kar jokwe ilo Ailinginae im mōñā mōñā in ailiñ kein ko wōt jen ailiñ eo, scientist ro rej antone bwe joñan radiation eo elaptata im juōn armij emaroñ bwelen bōke iumin juōn yiō jen atom ko reradioactive im rar walok jen ien kōkōmmālmel eo an United States ej 270 millirem. Ak joñan radiation eo elaptata ekkā an juōn armij maroñ bwelen bōke enaj drik jen joñan in. Joñan radiation in ej driklok yiō otemjej, bōtab ekanuij in rumwij an driklok.

Joñan radiation eo iolap (average) eo elaptata im juōn armij emaroñ bwelen bōke ilo yiō kein 30 rej itok ej 1700 millirem ilo jabrewōt mōttan ko ilo enbwini, im 2100 millirem ilo wōt nonnonmej.

Ilo yiō kein 30 rej itok, scientist ro rej antone bwe emaroñ wor 5 armij remaroñ mij jen nañinmij in cancer ko rej walok jen un ko jet ijellokin radiation eo ej itok jen ien kōkōmmālmel kin atomic bomb ko. Innem emaroñ bar kobatok 0.03 ñōn 0.2 oran ro remaroñ mij ilo yiō kane rej itok, jen cancer ko rej walok jen radiation eo rej bōke ilo yiō kein 30 rej itok, jen ien kōkōmmālmel kin atomic bomb ko.

Ilo yiō kein 30 rej itok, scientist ro rej antone bwe emaroñ wor 25 ajiri rej lotaktok kin nañinmij ak utamwe walok jen un ko jet ijellokin radiation eo ej itok jen ien kōkōmmālmel kin atomic bomb ko. Innem emaroñ kobatok 0.002 ñōn 0.03 oran ajiri ro renaj bwelen lotaktok tokelik kin utamwe, walok jen radiation eo jineir ak jemeir rej bōke ilo yiō kein 30 rej itok, jen ien kōkōmmālmel kin atomic bomb ko.

Information That Has Been Obtained from the Measurements Made in 1978

If 100 people would live on Ailinginae Atoll and eat local food only from that atoll, scientists estimate that the largest amount of radiation a person might receive in one year from radioactive atoms that came from the U.S. bomb tests is 270 millirem. But usually the largest amount a person might receive would be less than this. This amount of radiation decreases every year, however, it decreases very slowly.

The highest average amount of radiation a person might receive in the coming 30 years is 1700 millirem in any part of the body and 2100 millirem in just the bone marrow.

In the coming 30 years, scientists estimate that 5 people may die from cancers caused by things other than radiation from the atomic bomb tests. In addition to this, from 0.03 to 0.2 people may die in the future from cancers caused by radiation received in the coming 30 years from the atomic bomb tests.

In the coming 30 years, scientists estimate that 25 children could be born with health defects caused by things other than radiation from the atomic bomb tests. In addition to this, 0.002 to 0.03 children may eventually be born with health defects caused by radiation their parents receive in the coming 30 years from the atomic bomb tests.



Edriktate joñan atom ko re-radioactive ie

The least amount of radioactive atoms



Edrik joñan atom ko re-radioactive ie

A small amount of radioactive atoms



Elaplok joñan atom ko re-radioactive ie

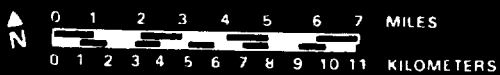
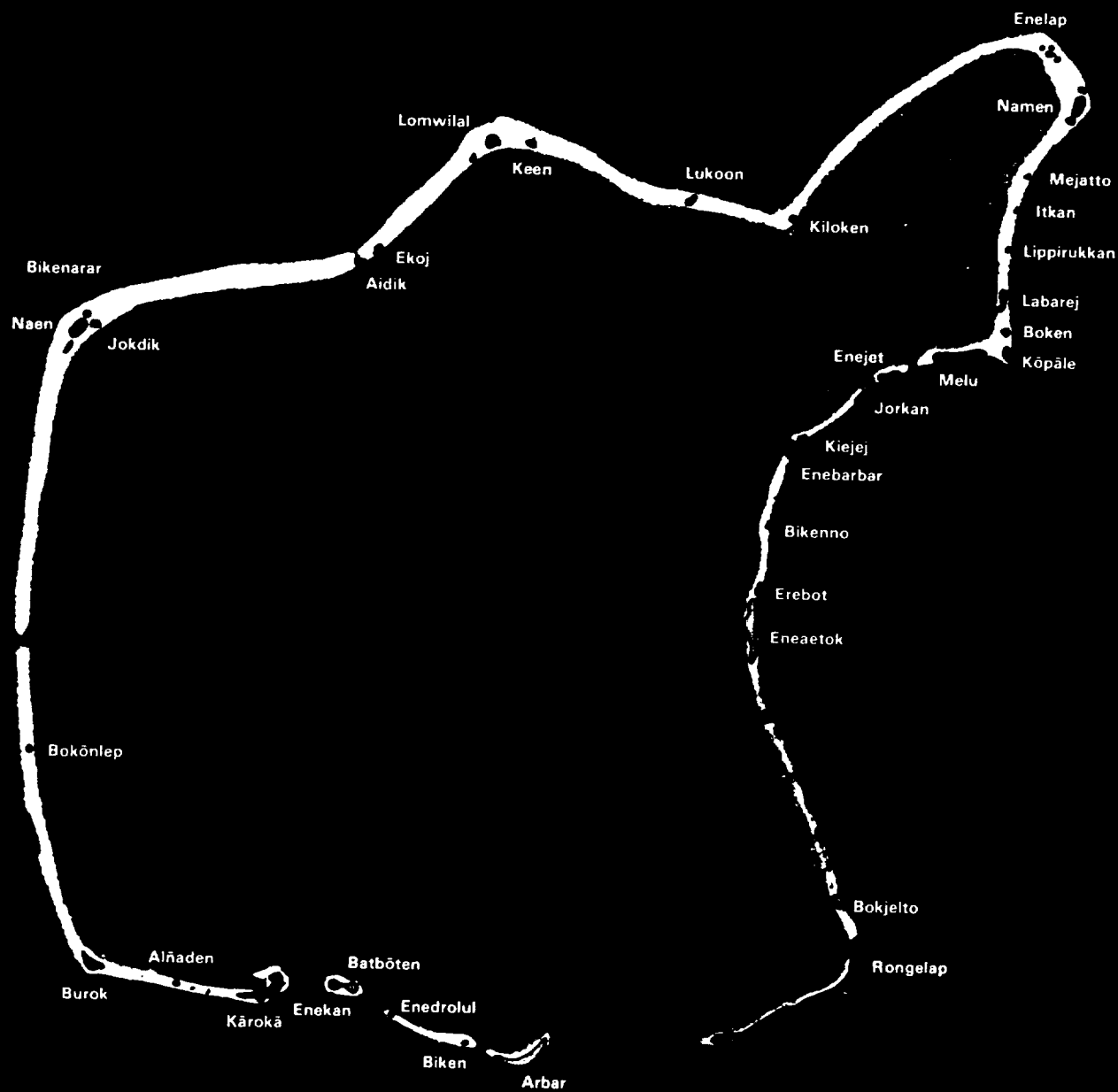
A larger amount of radioactive atoms



Elaptata joñan atom ko re-radioactive ie

The largest amount of radioactive atoms

Ailiñ in Rongelap



Melele ko Retōbrak jen Joñok ko ilo 1978

Elañe 233 armij rej jokwe ionenen Rongelap im mōñā mōñā in ailiñ kein ko wōt jen ionene:

Scientist ro rej antone bwe joñan radiation eo elaptata im juōn armij emaroñ bwelen bōke iumin juōn yiō jen atom ko reradioactive im rar walok jen ien kōkōmmālmel eo an United States ej 400 millirem. Ak joñan radiation eo elaptata ekkā an juōn armij maroñ bwelen bōke enaj drik jen joñan in. Joñan radiation in ej driklok yiō otemjej, bōtab ekanuij in rumwij an driklok.

Joñan radiation eo iolap (average) eo elaptata im juōn armij emaroñ bwelen bōke ilo yiō kein 30 rej itok ej 2500 millirem ilo jabrewōt mōttan ko ilo enbwin, im 3300 millirem ilo wōt nonnonmej.

Ilo yiō kein 30 rej itok, scientist ro rej antone bwe emaroñ wor 10 armij remaroñ mij jen nañinmij in cancer ko rej walok jen un ko jet ijellokin radiation eo ej itok jen ien kōkōmmālmel kin atomic bomb ko. Innem emaroñ bar kobatok 0.1 ñōn 0.6 oran ro remaroñ mij ilo yiō kane rej itok, jen cancer ko rej walok jen radiation eo rej bōke ilo yiō kein 30 rej itok, jen ien kōkōmmālmel kin atomic bomb ko.

Ilo yiō kein 30 rej itok, scientist ro rej antone bwe emaroñ wor 60 ajiri rej lotaktok kin nañinmij ak utamwe walok jen un ko jet ijellokin radiation eo ej itok jen ien kōkōmmālmel kin atomic bomb ko. Innem emaroñ kobatok 0.007 ñōn 0.1 oran ajiri ro renaj bwelen lotaktok tokelik kin utamwe, walok jen radiation eo jineir ak jemeir rej bōke ilo yiō kein 30 rej itok, jen ien kōkōmmālmel kin atomic bomb ko.

Elañe armij renaj jokwe ion Eneaetok im jab ionenen Rongelap, im mōñā mōñā in ailiñ kein ko wōt jen Eneaetok, joñan radiation eo rej bōke enaj bwelen ja joñan eo wōt.

Elañe armij renaj etal ñōn Naen jen ionenen Rongelap, im mōñā mōñā ko jen Naen, emaroñ tarrin lalim alen an laplok joñan radiation eo remaroñ bwelen bōke ilo air bed ijo.

Elañe armij renaj etal ñōn Namen ak Melu jen ionenen Rongelap, im mōñā mōñā ko jen ene kein ruo, emaroñ tarrin ruo alen an laplok joñan radiation eo rej bōke ilo air bed ijo.

Information That Has Been Obtained from the Measurements Made in 1978

If 233 people live on Rongelap Island and eat local food only from Rongelap Island

Scientists estimate that the largest amount of radiation a person might receive in one year from radioactive atoms that came from the U.S. bomb tests is 400 millirem. But usually the largest amount a person might receive would be less than this. This amount of radiation decreases every year, however, it decreases very slowly.

The highest average amount of radiation people might receive in the coming 30 years is 2500 millirem in any part of the body and 3300 millirem in just the bone marrow.

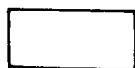
In the coming 30 years, scientists estimate that 10 people may die from cancers caused by things other than radiation from the atomic bomb tests. In addition to this, from 0.1 to 0.6 people may die in the future from cancers caused by radiation received in the coming 30 years from the atomic bomb tests.

In the coming 30 years, scientists estimate that 60 children could be born with health defects caused by things other than radiation from the atomic bomb tests. In addition to this, 0.007 to 0.1 children may eventually be born with health defects caused by radiation their parents receive in the coming 30 years from the atomic bomb tests.

If people live on Eneaetok and not on Rongelap Island, and eat local food only from Eneaetok, the amount of radiation they receive would be about the same.

If people go to Naen from Rongelap Island, and eat food from Naen, they might receive about five times more radiation while they are there.

If people go to Namen or Melu from Rongelap Island, and eat food from those two islands, they could receive about two times more radiation while they are there.



Edriktata joñan atom ko re-radioactive ie

The least amount of radioactive atoms



Edrik joñan atom ko re-radioactive ie

A small amount of radioactive atoms



Elaplok joñan atom ko re-radioactive ie

A larger amount of radioactive atoms



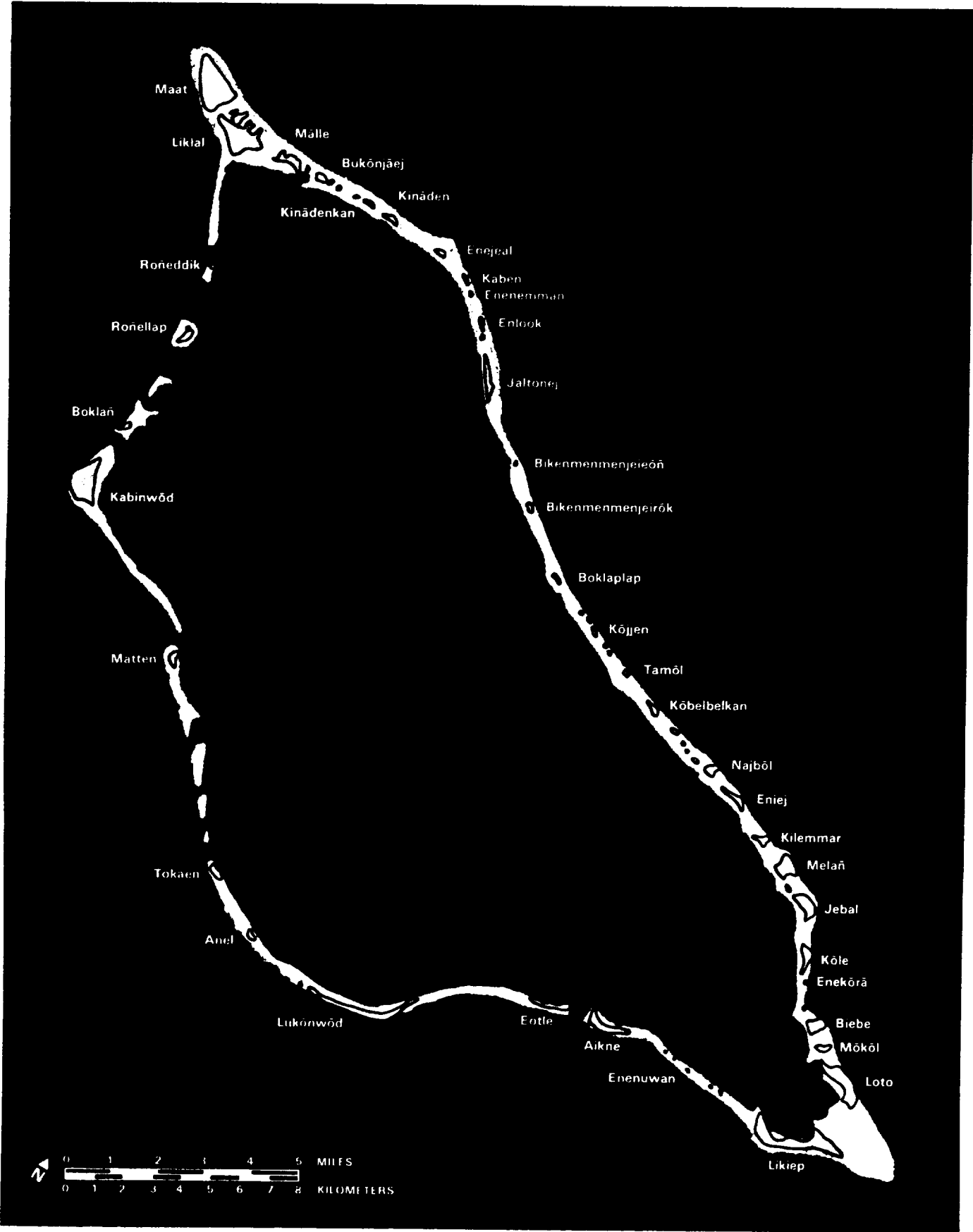
Elaptata joñan atom ko re-radioactive ie

The largest amount of radioactive atoms

Ailiñ in Rongrik



Ailiñ in Likiep



Melele ko Retōbrak jen Joñok ko ilo 1978

Elañe 487 armij rej jokwe ionenen Likiep im mōñā mōñā in ailiñ kein ko wōt jen ionene:

Scientist ro rej antone bwe joñan radiation eo elaptata im juōn armij emaroñ bwelen bōke iumin juōn yiō jen atom ko reradioactive im rar walok jen ien kōkōmmālmel eo an United States ej 75 millirem. Ak joñan radiation eo elaptata ekkā an juōn armij maroñ bwelen bōke enaj drik jen joñan in. Joñan radiation in ej driklok yiō otemjej, bōtab ekanuij in rumwij an driklok.

Joñan radiation eo iolap (average) eo elaptata im juōn armij emaroñ bwelen bōke ilo yiō kein 30 rej itok ej 530 millirem ilo jabrewōt mōttan ko ilo enbwin, im 580 millirem ilo wōt nonnonmej.

Ilo yiō kein 30 rej itok, scientist ro rej antone bwe emaroñ wor 20 armij remaroñ mij jen nañinmij in cancer ko rej walok jen un ko jet ijellokin radiation eo ej itok jen ien kōkōmmālmel kin atomic bomb ko. Innem emaroñ bar kobatok 0.03 ñōn 0.2 oran ro remaroñ mij ilo yiō kane rej itok, jen cancer ko rej walok jen radiation eo rej bōke ilo yiō kein 30 rej itok, jen ien kōkōmmālmel kin atomic bomb ko.

Ilo yiō kein 30 rej itok, scientist ro rej antone bwe emaroñ wor 120 ajiri rej lotaktok kin nañinmij ak utamwe walok jen un ko jet ijellokin radiation eo ej itok jen ien kōkōmmālmel kin atomic bomb ko. Innem emaroñ kobatok 0.003 ñōn 0.05 oran ajiri ro renaj bwelen lotaktok tokelik kin utamwe, walok jen radiation eo jineir ak jemeir rej bōke ilo yiō kein 30 rej itok, jen ien kōkōmmālmel kin atomic bomb ko.

Elañe armij renaj jokwe ak ikkurelok ñōn ene ko jet ilo ailiñ in Likiep ijellokin ionene, joñan radiation eo remaroñ bōke enaj ja joñan eo wōt, ñe jab driklok jidrik.

Information That Has Been Obtained from the Measurements Made in 1978

If 487 people live on Likiep Island and eat local food only from Likiep Island

Scientists estimate that the largest amount of radiation a person might receive in one year from radioactive atoms that came from the U.S. bomb tests is 75 millirem. But usually the largest amount a person might receive would be less than this. This amount of radiation decreases every year, however, it decreases very slowly.

The highest average amount of radiation people might receive in the coming 30 years is 530 millirem in any part of the body and 580 millirem in just the bone marrow.

In the coming 30 years, scientists estimate that 20 people may die from cancers caused by things other than radiation from the atomic bomb tests. In addition to this, from 0.03 to 0.2 people may die in the future from cancers caused by radiation received in the coming 30 years from the atomic bomb tests.

In the coming 30 years, scientists estimate that 120 children could be born with health defects caused by things other than radiation from the atomic bomb tests. In addition to this, 0.003 to 0.05 children may eventually be born with health defects caused by radiation their parents receive in the coming 30 years from the atomic bomb tests.

If people live on or visit islands in Likiep Atoll other than Likiep Island, the amount of radiation they could receive would be about the same or a little less.



Edriktata joñan atom ko re-radioactive ie

The least amount of radioactive atoms



Edrik joñan atom ko re-radioactive ie

A small amount of radioactive atoms



Elaplok joñan atom ko re-radioactive ie

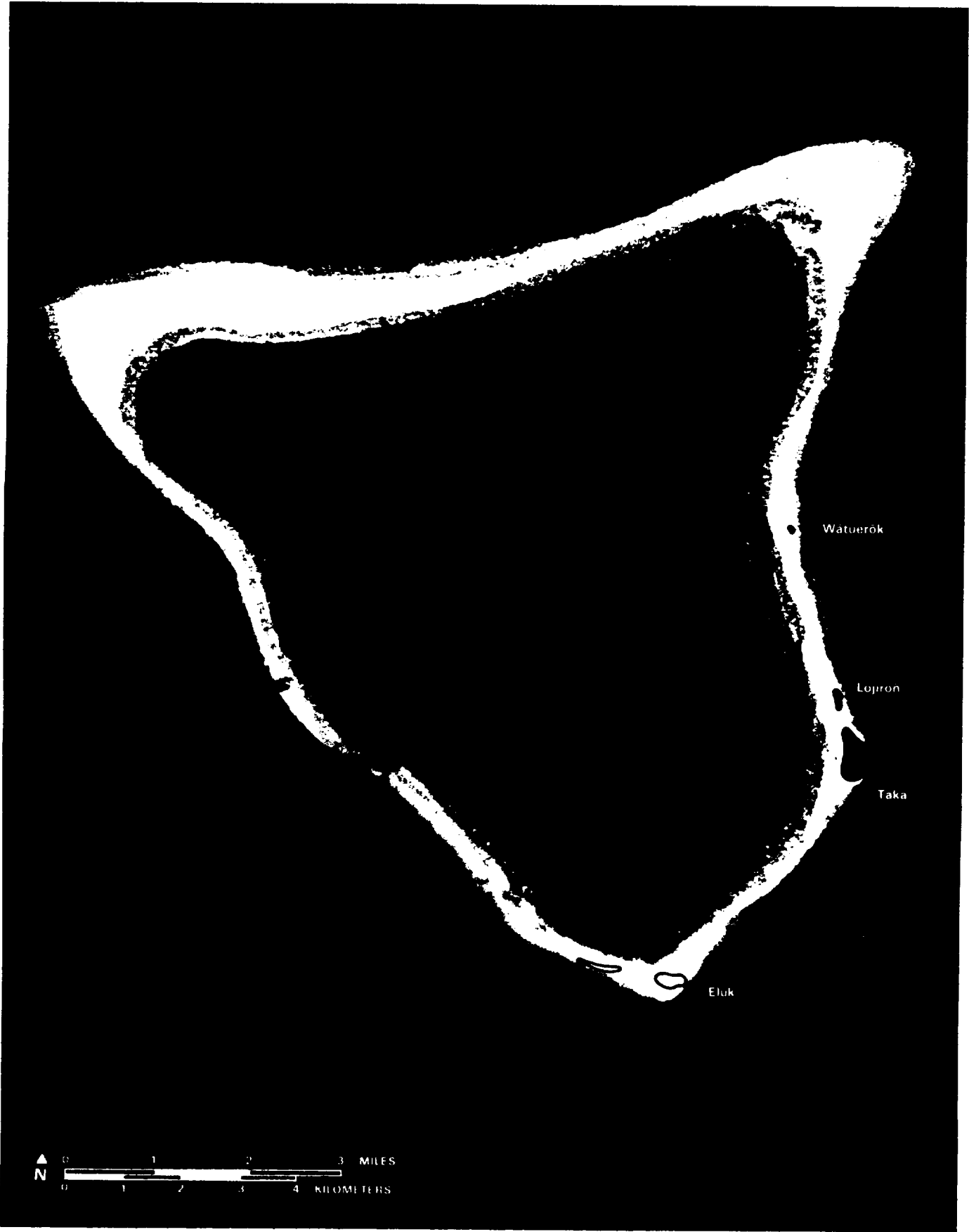
A larger amount of radioactive atoms



Elaptata joñan atom ko re-radioactive ie

The largest amount of radioactive atoms

Ailiñ in Taka



Melele ko Retōbrak jen Joñok ko ilo 1978

Elañe 100 armij renaj kar jokwe ilo ailiñ in Taka im mōñā mōñā in ailiñ kein ko wōt jen ailiñ eo, scientist ro rej antone bwe joñan radiation eo elaptata im juōn armij emaroñ bwelen bōke iumin juōn yiō jen atom ko reradioactive im rar walok jen ien kōkōmmālmel eo an United States ej 20 millirem. Ak joñan radiation eo elaptata ekkā an juōn armij maroñ bwelen bōke enaj drik jen joñan in. Joñan radiation in ej driklok yiō otemjej, bōtab ekanuij in rumwij an driklok.

Joñan radiation eo iolap (average) eo elaptata im juōn armij emaroñ bwelen bōke ilo yiō kein 30 rej itok ej 140 millirem ilo jabrewōt mōttan ko ilo enbwin, im 170 millirem ilo wōt nonnonmej.

Ilo yiō kein 30 rej itok, scientist ro rej antone bwe emaroñ wor 5 armij remaroñ mij jen nañinmij in cancer ko rej walok jen un ko jet ijellokin radiation eo ej itok jen ien kōkōmmālmel kin atomic bomb ko. Innem emaroñ bar kobatok 0.002 ñōn 0.01 oran ro remaroñ mij ilo yiō kane rej itok, jen cancer ko rej walok jen radiation eo rej bōke ilo yiō kein 30 rej itok, jen ien kōkōmmālmel kin atomic bomb ko.

Ilo yiō kein 30 rej itok, scientist ro rej antone bwe emaroñ wor 25 ajiri rej lotaktok kin nañinmij ak utamwe walok jen un ko jet ijellokin radiation eo ej itok jen ien kōkōmmālmel kin atomic bomb ko. Innem emaroñ kobatok 0.0002 ñōn 0.002 oran ajiri ro renaj bwelen lotaktok tokelik kin utamwe, walok jen radiation eo jineir ak jemeir rej bōke ilo yiō kein 30 rej itok, jen ien kōkōmmālmel kin atomic bomb ko.

Information That Has Been Obtained from the Measurements Made in 1978

If 100 people would live on Taka Atoll, and eat local food only from that atoll, scientists estimate that the largest amount of radiation a person might receive in one year from radioactive atoms that came from the U.S. bomb tests is 20 millirem. But usually the largest amount a person might receive would be less than this. This amount of radiation decreases every year, however, it decreases very slowly.

The highest average amount of radiation a person might receive in the coming 30 years is 140 millirem in any part of the body and 170 millirem in just the bone marrow.

In the coming 30 years, scientists estimate that 5 people may die from cancers caused by things other than radiation from the atomic bomb tests. In addition to this, from 0.002 to 0.01 people may die in the future from cancers caused by radiation received in the coming 30 years from the atomic bomb tests.

In the coming 30 years, scientists estimate that 25 children could be born with health defects caused by things other than radiation from the atomic bomb tests. In addition to this, 0.0002 to 0.002 children may eventually be born with health defects caused by radiation their parents receive in the coming 30 years from the atomic bomb tests.



Edriktata joñan atom ko re-radioactive ie

The least amount of radioactive atoms



Edrik joñan atom ko re-radioactive ie

A small amount of radioactive atoms



Elaplok joñan atom ko re-radioactive ie

A larger amount of radioactive atoms



Elaptata joñan atom ko re-radioactive ie

The largest amount of radioactive atoms

Ailiñ in Jemo



Melele ko Retōbrak jen Joñok ko ilo 1978

Elañe 100 armij renaj kar jokwe ilo Jemo im mōñā mōñā in ailiñ kein ko wōt jen Jemo, scientist ro rej antone bwe joñan radiation eo elaptata im juōn armij emaroñ bwelen bōke iumin juōn yiō jen atom ko reradioactive im rar walok jen ien kōkōmmālmel eo an United States ej 50 millirem. Ak joñan radiation eo elaptata ekkā an juōn armij maroñ bwelen bōke enaj drik jen joñan in. Joñan radiation in ej driklok yiō otemjej, bōtab ekanuij in rumwij an driklok.

Joñan radiation eo iolap (average) eo elaptata im juōn armij emaroñ bwelen bōke ilo yiō kein 30 rej itok ej 330 millirem ilo jabrewōt mōttan ko ilo enbwin, im 390 millirem ilo wōt nonnonmej.

Ilo yiō kein 30 rej itok, scientist ro rej antone bwe emaroñ wor 5 armij remaroñ mij jen nañinmij in cancer ko rej walok jen un ko jet ijellokin radiation eo ej itok jen ien kōkōmmālmel kin atomic bomb ko. Innem emaroñ bar kobatok 0.005 ñōn 0.03 oran ro remaroñ mij ilo yiō kane rej itok, jen cancer ko rej walok jen radiation eo rej bōke ilo yiō kein 30 rej itok, jen ien kōkōmmālmel kin atomic bomb ko.

Ilo yiō kein 30 rej itok, scientist ro rej antone bwe emaroñ wor 25 ajiri rej lotaktok kin nañinmij ak utamwe walok jen un ko jet ijellokin radiation eo ej itok jen ien kōkōmmālmel kin atomic bomb ko. Innem emaroñ kobatok 0.0004 ñōn 0.006 oran ajiri ro renaj bwelen lotaktok tokelik kin utamwe, walok jen radiation eo jineir ak jemeir rej bōke ilo yiō kein 30 rej itok, jen ien kōkōmmālmel kin atomic bomb ko.

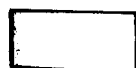
Information That Has Been Obtained from the Measurements Made in 1978

If 100 people would live on Jemo, and eat local food only from Jemo, scientists estimate that the largest amount of radiation a person might receive in one year from radioactive atoms that came from the U.S. bomb tests is 50 millirem. But usually the largest amount a person might receive would be less than this. This amount of radiation decreases every year, however, it decreases very slowly.

The highest average amount of radiation a person might receive in the coming 30 years is 330 millirem in any part of the body and 390 millirem in just the bone marrow.

In the coming 30 years, scientists estimate that 5 people may die from cancers caused by things other than radiation from the atomic bomb tests. In addition to this, from 0.005 to 0.03 people may die in the future from cancers caused by radiation received in the coming 30 years from the atomic bomb tests.

In the coming 30 years, scientists estimate that 25 children could be born with health defects caused by things other than radiation from the atomic bomb tests. In addition to this, 0.0004 to 0.006 children may be born with health defects caused by radiation their parents receive in the coming 30 years from the atomic bomb tests.



*Edriktata joñan
atom ko re-
radioactive ie*

*The least amount
of radioactive
atoms*



*Edrik joñan
atom ko re-
radioactive ie*

*A small amount of
radioactive atoms*



*Elaplok joñan
atom ko re-
radioactive ie*

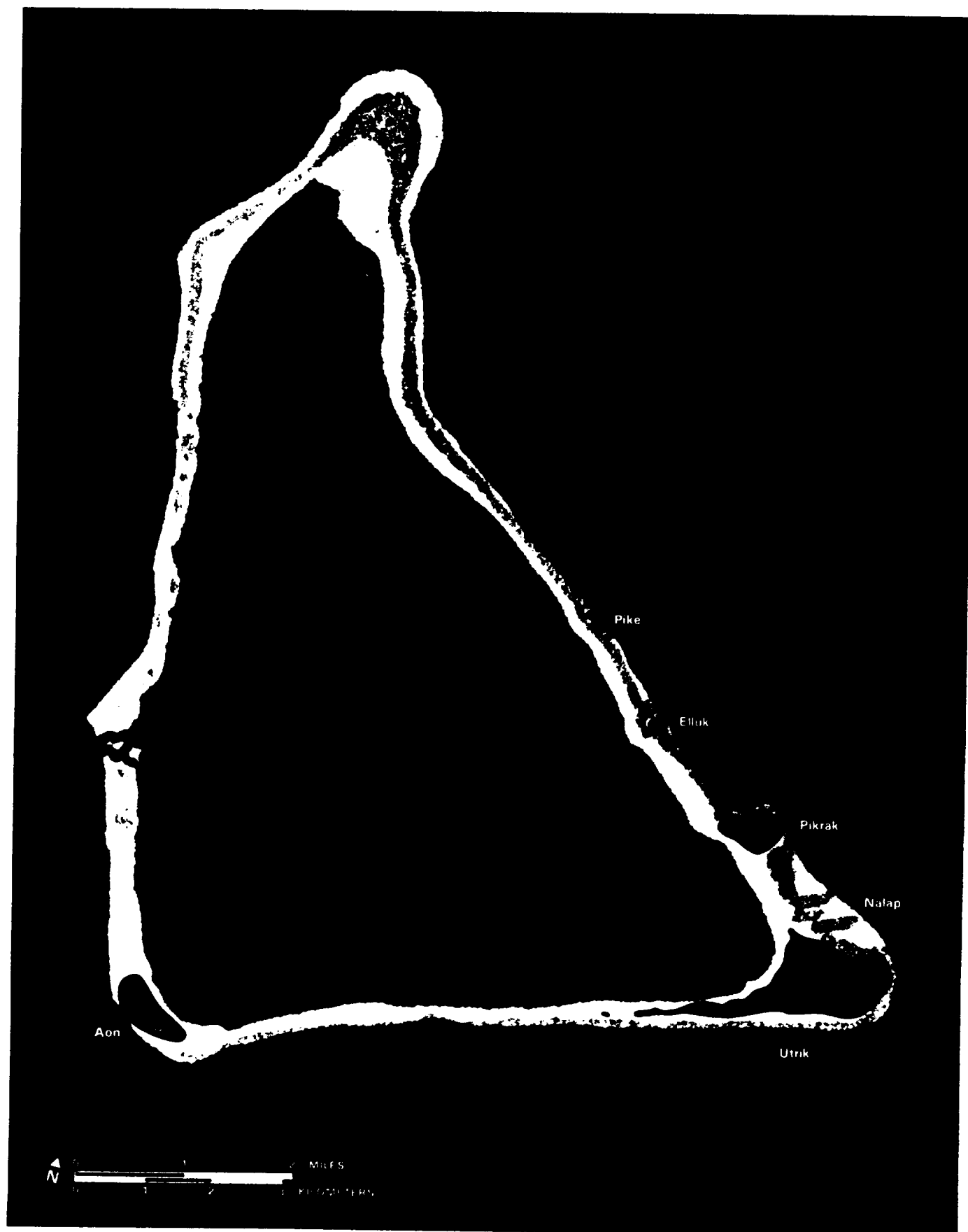
*A larger amount of
radioactive atoms*



*Elaptata joñan
atom ko re-
radioactive ie*

*The largest
amount of
radioactive atoms*

Ailiñ in Utrik



Melele ko Retōbrak jen Joñok ko ilo 1978

Elañe 328 armij rej jokwe ionenen Utrik im mōñā mōñā in ailiñ kein ko wōt jen ionene:

Scientist ro rej antone bwe joñan radiation eo elaptata im juōn armij emaroñ bwelen bōke iumin juōn yiō jen atom ko reradioactive im rar walok jen ien kōkōmmālmel eo an United States ej 75 millirem. Ak joñan radiation eo elaptata ekkā an juōn armij maroñ bwelen bōke enaj drik jen joñan in. Joñan radiation in ej driklok yiō otemjej, bōtab ekanuij in rumwij an driklok.

Joñan radiation eo iolap (average) eo elaptata im juōn armij emaroñ bwelen bōke ilo yiō kein 30 rej itok ej 490 millirem ilo jabrewōt mōttan ko ilo enbwin, im 590 millirem ilo wōt nonnonmej.

Ilo yiō kein 30 rej itok, scientist ro rej antone bwe emaroñ wor 15 armij remaroñ mij jen nañinmij in cancer ko rej walok jen un ko jet ijellokin radiation eo ej itok jen ien kōkōmmālmel kin atomic bomb ko. Innem emaroñ bar kobatok 0.02 ñōn 0.2 oran ro remaroñ mij ilo yiō kane rej itok, jen cancer ko rej walok jen radiation eo rej bōke ilo yiō kein 30 rej itok, jen ien kōkōmmālmel kin atomic bomb ko.

Ilo yiō kein 30 rej itok, scientist ro rej antone bwe emaroñ wor 80 ajiri rej lotaktok kin nañinmij ak utamwe walok jen un ko jet ijellokin radiation eo ej itok jen ien kōkōmmālmel kin atomic bomb ko. Innem emaroñ kobatok 0.002 ñōn 0.03 oran ajiri ro renaj bwelen lotaktok tokelik kin utamwe, walok jen radiation eo jineir ak jemeir rej bōke ilo yiō kein 30 rej itok, jen ien kōkōmmālmel kin atomic bomb ko.

Elañe armij renaj jokwe ion Aon im Pikrak, im mōñā mōñā ko ie im jab mōñā jen ionenen Utrik, ejamin kanuij einjuōn joñan radiation eo renaj bōke.

Information That Has Been Obtained from the Measurements Made in 1978

If 328 people live on Utrik Island and eat local food only from Utrik Island.

Scientists estimate that the largest amount of radiation a person might receive in one year from radioactive atoms that came from the U.S. bomb tests is 75 millirem. But usually the largest amount a person might receive would be less than this. This amount of radiation decreases every year, however, it decreases very slowly.

The highest average amount of radiation people might receive in the coming 30 years is 490 millirem in any part of the body and 590 millirem in just the bone marrow.

In the coming 30 years, scientists estimate that 15 people may die from cancers caused by things other than radiation from the atomic bomb tests. In addition to this, from 0.02 to 0.2 people may die in the future from cancers caused by radiation received in the coming 30 years from the atomic bomb tests.

In the coming 30 years, scientists estimate that 80 children could be born with health defects caused by things other than radiation from the atomic bomb tests. In addition to this, 0.002 to 0.03 children may eventually be born with health defects caused by radiation their parents receive in the coming 30 years from the atomic bomb tests.

If people live on Aon and Pikrak and eat food from there and not food from Utrik Island, the amount of radiation they receive would not be much different.



Edriktata joñan atom ko re-radioactive ie

The least amount of radioactive atoms



Edrik joñan atom ko re-radioactive ie

A small amount of radioactive atoms



Elaplok joñan atom ko re-radioactive ie

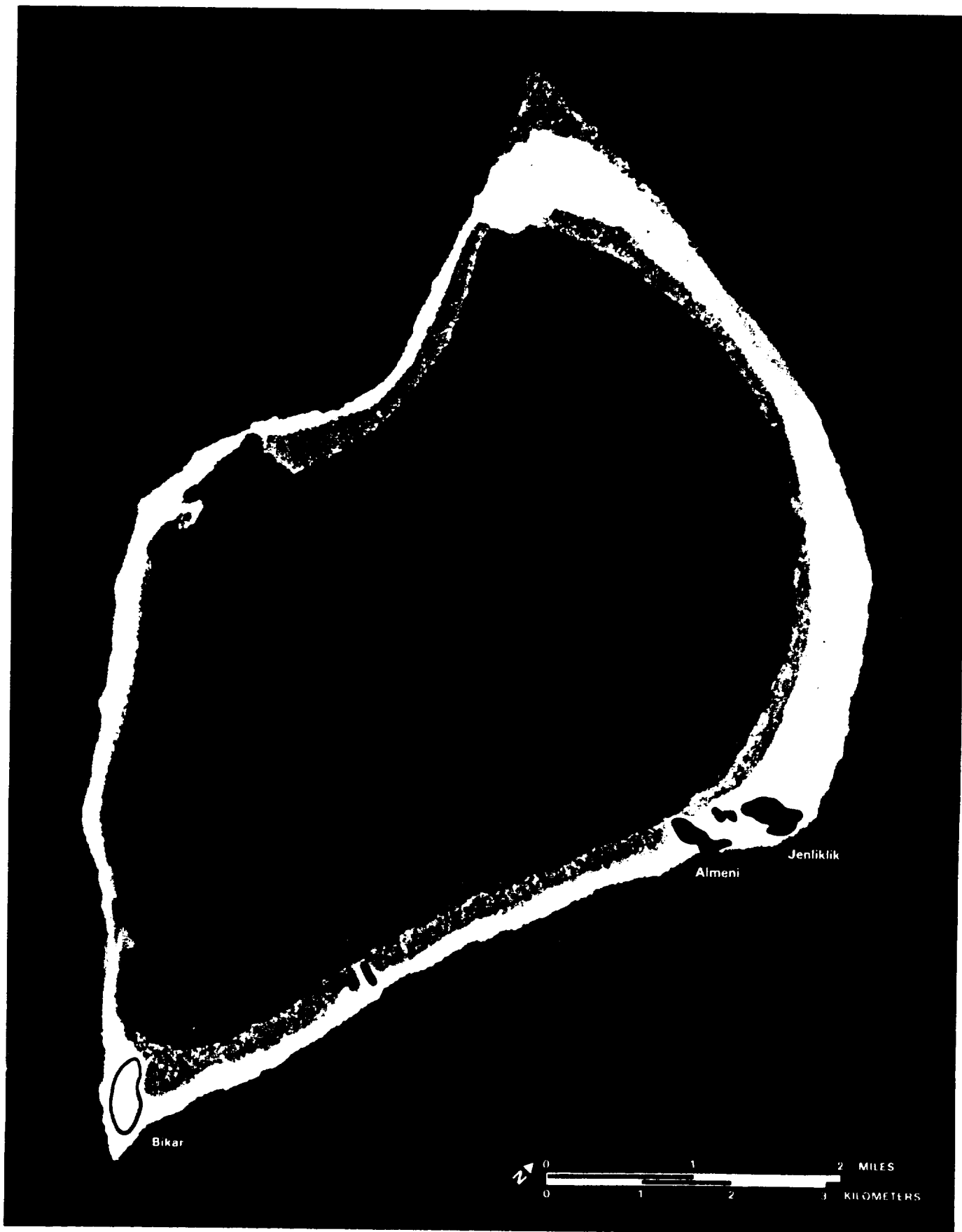
A larger amount of radioactive atoms



Elaptata joñan atom ko re-radioactive ie

The largest amount of radioactive atoms

Ailiñ in Bikar



Melele ko Retōbrak jen Joñok ko ilo 1978

Elañe 100 armij renaj kar jokwe ilo ailiñ in Bikar im mōñā mōñā in ailiñ kein ko wōt jen ailiñ eo, scientist ro rej antone bwe joñan radiation eo elaptata im juōn armij emaroñ bwelen bōke iumin juōn yiō jen atom ko reradioactive im rar walok jen ien kōkōmmālmel eo an United States ej 210 millirem. Ak joñan radiation eo elaptata ekkā an juōn armij maroñ bwelen bōke enaj drik jen joñan in. Joñan radiation in ej driklok yiō otemjej, bōtab ekanuij in rumwij an driklok.

Joñan radiation eo iolap (average) eo elaptata im juōn armij emaroñ bwelen bōke ilo yiō kein 30 rej itok ej 520 millirem ilo jabrewōt mōttan ko ilo enbwin, im 1800 millirem ilo wōt nonnonmej.

Ilo yiō kein 30 rej itok, scientist ro rej antone bwe emaroñ wor 5 armij remaroñ mij jen nañinmij in cancer ko rej walok jen un ko jet ijellokin radiation eo ej itok jen ien kōkōmmālmel kin atomic bomb ko. Innem emaroñ bar kobatok 0.02 ñōn 0.2 oran ro remaroñ mij ilo yiō kane rej itok, jen cancer ko rej walok jen radiation eo rej bōke ilo yiō kein 30 rej itok, jen ien kōkōmmālmel kin atomic bomb ko.

Ilo yiō kein 30 rej itok, scientist ro rej antone bwe emaroñ wor 25 ajiri rej lotaktok kin nañinmij ak utamwe walok jen un ko jet ijellokin radiation eo ej itok jen ien kōkōmmālmel kin atomic bomb ko. Innem emaroñ kobatok 0.0006 ñōn 0.009 oran ajiri ro renaj bwelen lotaktok tokelik kin utamwe, walok jen radiation eo jineir ak jemeir rej bōke ilo yiō kein 30 rej itok, jen ien kōkōmmālmel kin atomic bomb ko.

Information That Has Been Obtained from the Measurements Made in 1978

If 100 people would live on Bikar Atoll, and eat local food only from that atoll, scientists estimate that the largest amount of radiation a person might receive in one year from radioactive atoms that came from the U.S. bomb tests is 210 millirem. But usually the largest amount a person might receive would be less than this. This amount of radiation decreases every year, however, it decreases very slowly.

The highest average amount of radiation a person might receive in the coming 30 years is 520 millirem in any part of the body and 1800 millirem in just the bone marrow.

In the coming 30 years, scientists estimate that 5 people may die from cancers caused by things other than radiation from the atomic bomb tests. In addition to this, from 0.02 to 0.2 people may die in the future from cancers caused by radiation received in the coming 30 years from the atomic bomb tests.

In the coming 30 years, scientists estimate that 25 children could be born with health defects caused by things other than radiation from the atomic bomb tests. In addition to this, 0.0006 to 0.009 children may eventually be born with health defects caused by radiation their parents receive in the coming 30 years from the atomic bomb tests.



Edriktata joñan atom ko re-radioactive ie

The least amount of radioactive atoms



Edrik joñan atom ko re-radioactive ie

A small amount of radioactive atoms



Elaplok joñan atom ko re-radioactive ie

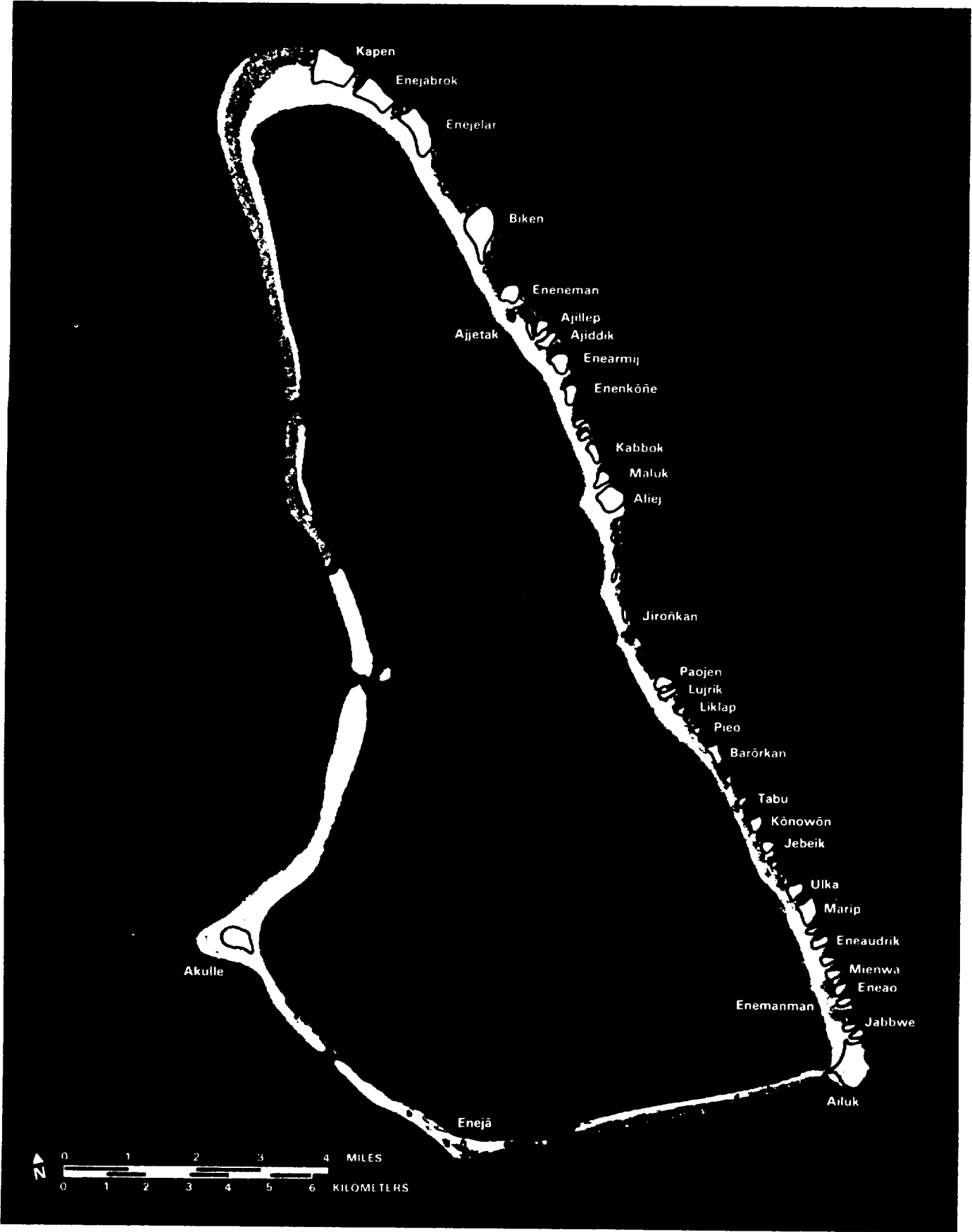
A larger amount of radioactive atoms



Elaptata joñan atom ko re-radioactive ie

The largest amount of radioactive atoms

Ailiñ in Ailuk



Melele ko Retōbrak jen Joñok ko ilo 1978

Elañe 420 armij rej jokwe ionenen Ailuk im mōñā mōñā in ailiñ kein ko wōt jen ionene:

Scientist ro rej antone bwe joñan radiation eo elaptata im juōn armij emaroñ bwelen bōke iumin juōn yiō jen atom ko reradioactive im rar walok jen ien kōkōmmālmel eo an United States ej 90 millirem. Ak joñan radiation eo elaptata ekkā an juōn armij maroñ bwelen bōke enaj drik jen joñan in. Joñan radiation in ej driklok yiō otemfej, bōtab ekanuij in rumwij an driklok.

Joñan radiation eo iolap (average) eo elaptata im juōn armij emaroñ bwelen bōke ilo yiō kein 30 rej itok ej 650 millirem ilo jabrewōt mōttan ko ilo enbwin, im 680 millirem ilo wōt nonnonmej.

Ilo yiō kein 30 rej itok, scientist ro rej antone bwe emaroñ wor 20 armij remaroñ mij jen nañinmij in cancer ko rej walok jen un ko jet ijellokin radiation eo ej itok jen ien kōkōmmālmel kin atomic bomb ko. Innem emaroñ bar kobatok 0.04 ñōn 0.2 oran ro remaroñ mij ilo yiō kane rej itok, jen cancer ko rej walok jen radiation eo rej bōke ilo yiō kein 30 rej itok, jen ien kōkōmmālmel kin atomic bomb ko.

Ilo yiō kein 30 rej itok, scientist ro rej antone bwe emaroñ wor 100 ajiri rej lotaktok kin nañinmij ak utamwe walok jen un ko jet ijellokin radiation eo ej itok jen ien kōkōmmālmel kin atomic bomb ko. Innem emaroñ kobatok 0.003 ñōn 0.05 oran ajiri ro renaj bwelen lotaktok tokelik kin utamwe, walok jen radiation eo jineir ak jemeir rej bōke ilo yiō kein 30 rej itok, jen ien kōkōmmālmel kin atomic bomb ko.

Elañe armij renaj jokwe ak ikkurelok ñōn ene ko jet ilo ailiñ in Ailuk ijellokin ionene, joñan radiation eo remaroñ bōke enaj bwelen ja joñan eo wōt.

Information That Has Been Obtained from the Measurements Made in 1978

If 420 people live on Ailuk Island and eat local food only from Ailuk Island

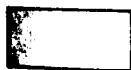
Scientists estimate that the largest amount of radiation a person might receive in one year from radioactive atoms that came from the U.S. bomb tests is 90 millirem. But usually the largest amount a person might receive would be less than this. This amount of radiation decreases every year, however, it decreases very slowly.

The highest average amount of radiation people might receive in the coming 30 years is 650 millirem in any part of the body and 680 millirem in just the bone marrow.

In the coming 30 years, scientists estimate that 20 people may die from cancers caused by things other than radiation from the atomic bomb tests. In addition to this, from 0.04 to 0.2 people may die in the future from cancers caused by radiation received in the coming 30 years from the atomic bomb tests.

In the coming 30 years, scientists estimate that 100 children could be born with health defects caused by things other than radiation from the atomic bomb tests. In addition to this, 0.003 to 0.05 children may eventually be born with health defects caused by radiation their parents receive in the coming 30 years from the atomic bomb tests.

If people live on or visit islands in Ailuk Atoll other than Ailuk Island, the amount of radiation they could receive would be about the same.



Edriktata joñan atom ko re-radioactive ie

The least amount of radioactive atoms



Edrik joñan atom ko re-radioactive ie

A small amount of radioactive atoms



Elaplok joñan atom ko re-radioactive ie

A larger amount of radioactive atoms



Elaptata joñan atom ko re-radioactive ie

The largest amount of radioactive atoms

Ailiñ in Mejit



Melele ko Retōbrak jen Joñok ko ilo 1978

Elañe 329 armij rej jokwe ilo Mejit im mōñā mōñā in ailiñ kein ko wōt jen Mejit:

Scientist ro rej antone bwe joñan radiation eo elaptata im juōn armij emaroñ bwelen bōke iumin juōn yiō jen atom ko reradioactive im rar walok jen ien kōkōmmālmel eo an United States ej 100 millirem. Ak joñan radiation eo elaptata ekkā an juōn armij maroñ bwelen bōke enaj drik jen joñan in. Joñan radiation in ej driklok yiō otemjej, bōtab ekanuij in rumwij an driklok.

Joñan radiation eo iolap (average) eo elaptata im juōn armij emaroñ bwelen bōke ilo yiō kein 30 rej itok ej 710 millirem ilo jabrewōt mōttan ko ilo enbwin, im 730 millirem ilo wōt nonnonmej.

Ilo yiō kein 30 rej itok, scientist ro rej antone bwe emaroñ wor 15 armij remaroñ mij jen nañinmij in cancer ko rej walok jen un ko jet ijellokin radiation eo ej itok jen ien kōkōmmālmel kin atomic bomb ko. Innem emaroñ bar kobatok 0.03 ñōn 0.2 oran ro remaroñ mij ilo yiō kane rej itok, jen cancer ko rej walok jen radiation eo rej bōke ilo yiō kein 30 rej itok, jen ien kōkōmmālmel kin atomic bomb ko.

Ilo yiō kein 30 rej itok, scientist ro rej antone bwe emaroñ wor 80 ajiri rej lotaktok kin nañinmij ak utamwe walok jen un ko jet ijellokin radiation eo ej itok jen ien kōkōmmālmel kin atomic bomb ko. Innem emaroñ kobatok 0.003 ñōn 0.04 oran ajiri ro renaj bwelen lotaktok tokelik kin utamwe, walok jen radiation eo jineir ak jemeir rej bōke ilo yiō kein 30 rej itok, jen ien kōkōmmālmel kin atomic bomb ko.

Information That Has Been Obtained from the Measurements Made in 1978

If 328 people live on Mejit Island and eat local food only from Mejit Island:

Scientists estimate that the largest amount of radiation a person might receive in one year from radioactive atoms that came from the U.S. bomb tests is 100 millirem. But usually the largest amount a person might receive would be less than this. This amount of radiation decreases every year; however, it decreases very slowly.

The highest average amount of radiation people might receive in the coming 30 years is 710 millirem in any part of the body and 730 millirem in just the bone marrow.

In the coming 30 years, scientists estimate that 15 people may die from cancers caused by things other than radiation from the atomic bomb tests. In addition to this, from 0.03 to 0.2 people may die in the future from cancers caused by radiation received in the coming 30 years from the atomic bomb tests.

In the coming 30 years, scientists estimate that 80 children could be born with health defects caused by things other than radiation from the atomic bomb tests. In addition to this, 0.003 to 0.04 children may eventually be born with health defects caused by radiation their parents receive in the coming 30 years from atomic bomb tests.



Edriktata joñan atom ko re-radioactive ie

The least amount of radioactive atoms



Edrik joñan atom ko re-radioactive ie

A small amount of radioactive atoms



Elaplok joñan atom ko re-radioactive ie

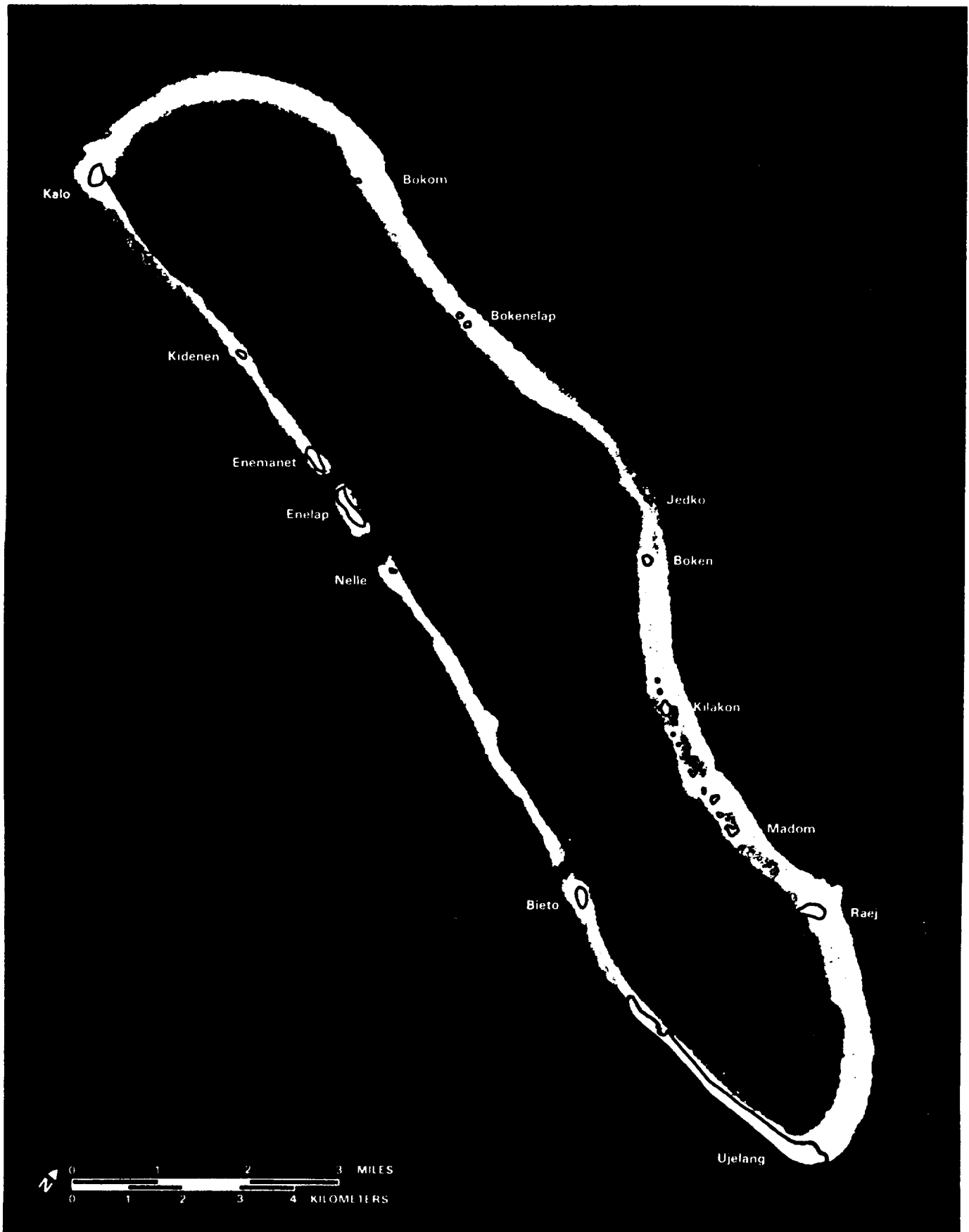
A larger amount of radioactive atoms



Elaptata joñan atom ko re-radioactive ie

The largest amount of radioactive atoms

Ailiñ in Ujelang



Melele ko Retōbrak jen Joñok ko ilo 1978

Elañe 100 armij rej jokwe ionenen Ujelang im mōñā mōñā in ailiñ kein ko wōt jen ionene:

Scientist ro rej antone bwe joñan radiation eo elaptata im juōn armij emaroñ bwelen bōke iumin juōn yiō jen atom ko reradioactive im rar walok jen ien kōkōmmālmel eo an United States ej 20 millirem. Ak joñan radiation eo elaptata ekkā an juōn armij maroñ bwelen bōke enaj drik jen joñan in. Joñan radiation in ej driklok yiō otemjej, bōtab ekanuij in rumwij an driklok.

Joñan radiation eo iolap (average) eo elaptata im juōn armij emaroñ bwelen bōke ilo yiō kein 30 rej itok ej 130 millirem ilo jabrewōt mōttan ko ilo enbwin, im 150 millirem ilo wōt nonnonmej.

Ilo yiō kein 30 rej itok, scientist ro rej antone bwe emaroñ wor 5 armij remaroñ mij jen nañinmij in cancer ko rej walok jen un ko jet ijellokin radiation eo ej itok jen ien kōkōmmālmel kin atomic bomb ko. Innem emaroñ bar kobatok 0.002 ñōn 0.01 oran ro remaroñ mij ilo yiō kane rej itok, jen cancer ko rej walok jen radiation eo rej bōke ilo yiō kein 30 rej itok, jen ien kōkōmmālmel kin atomic bomb ko.

Ilo yiō kein 30 rej itok, scientist ro rej antone bwe emaroñ wor 25 ajiri rej lotaktok kin nañinmij ak utamwe walok jen un ko jet ijellokin radiation eo ej itok jen ien kōkōmmālmel kin atomic bomb ko. Innem emaroñ kobatok 0.0002 ñōn 0.002 oran ajiri ro renaj bwelen lotaktok tokelik kin utamwe, walok jen radiation eo jineir ak jemeir rej bōke ilo yiō kein 30 rej itok, jen ien kōkōmmālmel kin atomic bomb ko.

Elañe armij renaj jokwe ak ikkurelok ñōn ene ko jet ilo ailiñ in Ujelang ijellokin ionene, joñan radiation eo remaroñ bōke enaj bwelen ja joñan eo wōt.

Information That Has Been Obtained from the Measurements Made in 1978

If 100 people live on Ujelang Island and eat local food only from Ujelang Island:

Scientists estimate that the largest amount of radiation a person might receive in one year from radioactive atoms that came from the U.S. bomb tests is 20 millirem. But usually the largest amount a person might receive would be less than this. This amount of radiation decreases every year, however, it decreases very slowly.

The highest average amount of radiation people might receive in the coming 30 years is 130 millirem in any part of the body and 150 millirem in just the bone marrow.

In the coming 30 years, scientists estimate that 5 people may die from cancers caused by things other than radiation from the atomic bomb tests. In addition to this, from 0.002 to 0.01 people may die in the future from cancers caused by radiation received in the coming 30 years from the atomic bomb tests.

In the coming 30 years, scientists estimate that 25 children could be born with health defects caused by things other than radiation from the atomic bomb tests. In addition to this, 0.0002 to 0.002 children may eventually be born with health defects caused by radiation their parents receive in the coming 30 years from the atomic bomb tests.

If people live on or visit islands in Ujelang Atoll other than Ujelang Island, the amount of radiation they could receive would be about the same.



Edriktata joñan atom ko re-radioactive ie

The least amount of radioactive atoms



Edrik joñan atom ko re-radioactive ie

A small amount of radioactive atoms



Elaplok joñan atom ko re-radioactive ie

A larger amount of radioactive atoms



Elaptata joñan atom ko re-radioactive ie

The largest amount of radioactive atoms

Ailiñ in Enewetak



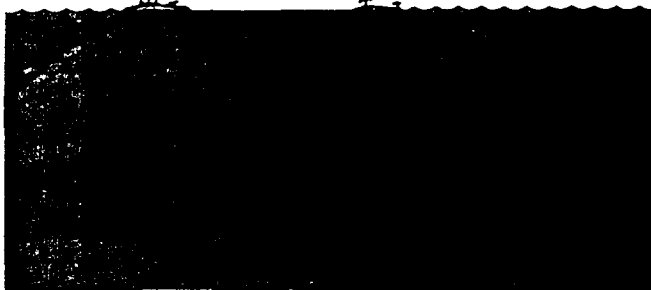
Aolep melele ko kin joñan radiation eo ilo ailiñ
in Enewetak rebed ilo book eo naetan "Ailiñ in
Enewetak Rainin."

All of the information about the amount of radiation at Enewetak Atoll is in the
book, "The Enewetak Atoll Today."



Ailin in ENEWETAK Rainin

The ENEWETAK Atoll Today



*Edriktata joñan
atom ko re-
radioactive ie*

*The least amount
of radioactive
atoms*



*Edrik joñan
atom ko re-
radioactive ie*

*A small amount of
radioactive atoms*



*Elaplok joñan
atom ko re-
radioactive ie*

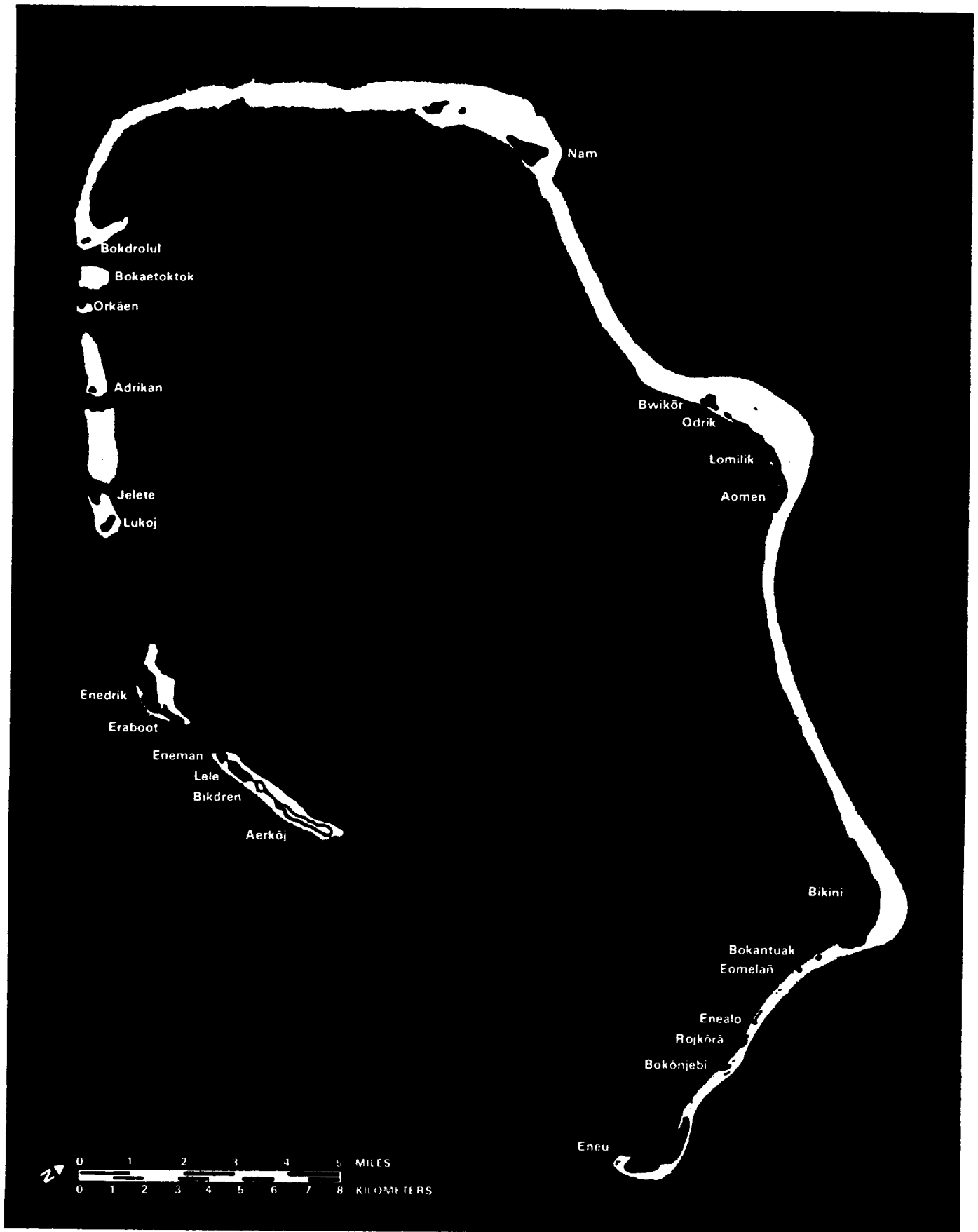
*A larger amount of
radioactive atoms*



*Elaptata joñan
atom ko re-
radioactive ie*

*The largest
amount of
radioactive atoms*

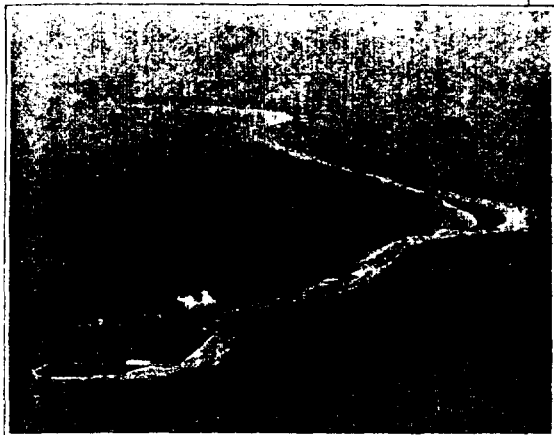
Ailiñ in Bikini



Aolep melele ko kin joñan radiation eo ilo ailiñ
in Bikini rebed ilo book eo naetan "Melelen
Radiation ilo Ailiñ in Bikini."

All of the information about the amount of radiation at Bikini Atoll is in the
book, "The Meaning of Radiation at Bikini Atoll."

MELELEN RADIATION ILO AILIÑ IN BIKINI



THE MEANING OF RADIATION
AT BIKINI ATOLL



*Edriktata joñan
atom ko re-
radioactive ie*

*The least amount
of radioactive
atoms*



*Edrik joñan
atom ko re-
radioactive ie*

*A small amount of
radioactive atoms*



*Elaplok joñan
atom ko re-
radioactive ie*

*A larger amount of
radioactive atoms*



*Elaptata joñan
atom ko re-
radioactive ie*

*The largest
amount of
radioactive atoms*

Melelen Nan ko Rekāl

atom - Men ko rekanuij in iddrik im rej ejake men otemjej ilōl in. Jejjab maroñ loi. (page 5, 10)

radioactive atom - Jabrewōt kain atom eo ej oktak ñōn bar juōn kain atom, im ilo an oktak ej kwalok juōn kajur eo naetan radiation. (page 5, 6, 10)

radiation - Juōn kain kajur eo ej walok jen atom ko reradioactive ilo air oktaklok im erom bar jet kain atom ko. Kajur in jejjab maroñ loe, roñjake, āt bwin, nemake, ak eñjake. (page 10, 13)

alpha radiation - Juōn kajur eo ekadru ijo emaroñ tōbare (bwelen 3 inch ilo mejatoto) jen atom eo ej walok jene, im men ko remāni, einwōt paper, remaroñ kabwijrake. (page 13)

beta radiation - Juōn kajur eo emaroñ tōbar bwelen 4 yard ilo mejatoto jen atom eo ej walok jene, im men ko remejillok jen paper, einwōt plywood, remaroñ kabwijrake. (page 13)

gamma radiation - Juōn kajur eo eaitok ijo emaroñ tōbare (bwelen 300 yard ilo mejatoto) jen atom eo ej walok jene, im men ko wōt rekanuij mejil im bin remaroñ kabwijrake, einwōt cement, drekā ko rellap, im jet kain māl (steel, lead). (page 13)

millirem - Etan bwinbwin ko scientist rej kejerbali ilo air joñe joñan kajur (radiation) juōn armij ej bōk ilo enbwinnin. (page 14)

standard (radiation standard) - Joñan radiation ko emwij karōki bwe armij ren jab bōk elaplok jeni. (page 29)

potassium - Juōn kain atom eo ear baj bed wōt ilo lōl in im ej mōttan lōl in, im ebed ilo men otemjej rej mour, im bareinwōt ilo drekā ko im bwirej. Juōn mōttan eo ekanuij in drik ilo potassium otemjej eradioactive. Kajur ko naetair beta im gamma radiation rej walok jen atom in potassium ko reradioactive. Atom in potassium ko reradioactive reban jako iumin taujin million yiō ko. (page 10, 12)

uranium - Aolep atom in uranium reradioactive. Atom in uranium rar baj bed wōt ilo lōl in im mōttan lōl in. Uranium ebed ilo elōñ kain drekā ko im ilo elōñ kain bwirej jabrewōt jikin ilōl in. Kajur eo naetan alpha radiation ej walok jen uranium. Eban jako uranium iumin taujin million yiō ko. (page 10, 12)

radium - Aolep atom in radium reradioactive im rej walok jen uranium. Atom in radium rar baj bed wōt ilo lōl in im mōttan lōl in. Kajur eo naetan alpha radiation ej walok jen radium. Toan wōt an wor uranium enaj wor wōt radium. (page 10, 12)

iodine (ko reradioactive) - Jet atom in iodine reradioactive, im kajur ko naetair beta radiation im gamma radiation rej walok jeni. Jimōttanin atom in iodine ko reradioactive renaj jako iumin 8 ran otemjej. (Bar lale page 10, 12, 25)

cobalt (ko reradioactive) - Jet atom in cobalt reradioactive, im kajur ko naetair beta radiation im gamma radiation rej walok jeni. Jimōttanin atom in cobalt ko reradioactive renaj jako iumin 5 yiō otemjej. (Bar lale page 10, 12)

cesium (ko reradioactive) - Jet atom in cesium reradioactive, im kajur ko naetair beta radiation im gamma radiation rej walok jeni. Jimōttanin atom in cesium ko reradioactive renaj jako iumin 30 yiō otemjej. (Bar lale page 10, 12)

strontium (ko reradioactive) - Jet atom in strontium reradioactive, im kajur eo naetan beta radiation ej walok jeni. Jimōttanin atom in strontium ko reradioactive renaj jako iumin 30 yiō otemjej. (Bar lale page 10, 11, 12)

americium - Aolep atom in americium reradioactive. Kajur ko naetair alpha radiation im gamma radiation rej walok jen atom in americium. Jimōttanin atom in americium ko renaj jako iumin 430 yiō otemjej. (Bar lale page 10, 12)

plutonium - Aolep atom in plutonium reradioactive. Kajur eo naetan alpha radiation ej walok jen atom in plutonium. Jimöttanin atom in plutonium ko renaj jako iumin 24,000 yiö otemjej. (Bar lale page 10, 12)

cell ko - Men ko remour im rekanuij in iddrik. Bwijn men jiddrik kein rej koba ibben dron ñon ejake jabrewöt men ej mour ilo löl in, im bareinwöt rej ejake möttan ko kajjojo ilo enbwin, einwöt mej, kil, dri, majel, menono, im bar möttan ko jet. Kajjojo cell kein ej ejak jen million million atom ko. (page 24, 25)

thyroid - Juön möttan enbwin eo edrik im ej bed ilo buru. (page 25)

The Meaning of New Words [Glossary]

atom - Very tiny things that make up everything in the world. We cannot see them. (page 5, 11)

radioactive atom - Any kind of atom that changes into another kind of atom, and as it changes it produces an energy called radiation. (page 5, 11)

radiation - A kind of power [energy] that comes from radioactive atoms as they change and become other kinds of atoms. This energy we cannot see, hear, smell, taste, or feel. (page 11, 13)

alpha radiation - An energy that can extend a short distance (about 3 inches in air) from the atom it comes from, and thin materials, like paper, can stop it. (page 13)

beta radiation - An energy that can extend perhaps 4 yards in air from the atom it comes from, and things thicker than paper, like plywood, can stop it. (page 13)

gamma radiation - An energy that can extend a long distance (about 300 yards in air) from the atom it comes from, and only things that are very thick and dense can stop it, such as concrete, large rocks, and some kinds of metal (steel, lead). (page 13)

millirem - The name of the numbers scientists use to measure the amount of energy (radiation) a person receives in his body. (page 15)

standard (radiation standard) - The amounts of radiation that have been established that people should not exceed. (pages 29)

potassium - A kind of atom that has always been in the world and is part of the world, and is in all living things, and also in rocks and soils. A very small part of all potassium is radioactive. Energies called beta and gamma radiation come from radioactive potassium atoms. Atoms of potassium that are radioactive will not disappear for thousands of millions of years. (page 11, 12)

uranium - All uranium atoms are radioactive. Uranium atoms have always been in the world and are part of the world. Uranium is in many kinds of rocks and in many kinds of soils everywhere in the world. The energy called alpha radiation comes from uranium. Uranium will not disappear for thousands of millions of years. (page 11, 12)

radium - All radium atoms are radioactive and they come from uranium. Radium atoms have always been in the world and are part of the world. The energy called alpha radiation comes from radium. As long as there is uranium there will also be radium. (page 11, 12)

iodine (that is radioactive) - Some iodine atoms are radioactive, and energies called beta radiation and gamma radiation come from them. Half of the radioactive iodine atoms will disappear during every 8 days. (Also see page 11, 12, 25)

cobalt (that is radioactive) - Some cobalt atoms are radioactive, and energies called beta radiation and gamma radiation come from them. Half of the radioactive cobalt atoms will disappear during every 5 years. (Also see page 11, 12)

cesium (that is radioactive) - Some cesium atoms are radioactive, and energies called beta radiation and gamma radiation come from them. Half of the radioactive cesium atoms will disappear during every 30 years. (Also see page 11, 12)

strontium (that is radioactive) - Some strontium atoms are radioactive, and an energy called beta radiation comes from them. Half of the radioactive strontium atoms will disappear during every 30 years. (Also see page 11, 12)

americium - All americium atoms are radioactive. Energies called alpha radiation and gamma radiation come from americium atoms. Half of the americium atoms will disappear during every 430 years. (Also see page 11, 12)

plutonium - All plutonium atoms are radioactive. The energy called alpha radiation comes from plutonium atoms. Half of the plutonium atoms will disappear during every 24,000 years. (Also see page 11, 12)

cells - Living things that are very tiny. Many of these tiny things join together to make up everything that is alive in the world and also they make up each part of the body such as eyes, skin, bones, muscles, heart, and the other parts. Each of these cells is made of millions and millions of atoms. (page 24, 25)

thyroid - A small part of the body located in the throat. (page 25)

Armij rein rar kōmmōn book in ñōn U.S. Department of Energy:

This book was prepared for the U.S. Department of Energy by the following people

Ri jeje ro

Authors

William J. Bair, Pacific Northwest Laboratory, Battelle Memorial Institute

John W. Healy, Los Alamos Scientific Laboratory

Bruce W. Wachholz, Office of Environment, Safety and Health,

U.S. Department of Energy

Ri ukok ro

Translators

Alice Buck, Honolulu, Hawaii

Melera Jelke, Ebeye, Kwajalein, Republic of the Marshall Islands, Trust Territory of the Pacific Islands

Korong Sam, Ebeye, Kwajalein, Republic of the Marshall Islands, Trust Territory of the Pacific Islands

Editor eo

Technical editor:

Ray W. Baalman, Pacific Northwest Laboratory, Battelle Memorial Institute

Ri kōmmōn pija

Graphics

Michael Sheets, Pacific Northwest Laboratory, Battelle Memorial Institute

Joñok ko ilo book in rej lori joñok ko an armij rein

Bases for dose estimates:

William L. Robison, et al., Lawrence Livermore National Laboratory

DOE/NBM--1052

